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World's Largest Apple User Group Magazine

July 1986 • $3.00 U.S.

Riding the Apple Wave

INSIDE:

- Stepping through ProDOS
- Review of "Kyan Pascal"
- Slot Saver Clock Driver

PLUS:

- Languages of Artificial Intelligence
- Spreadsheet "Net Worth" Template
- New Products, Good Advice, and much more. . .

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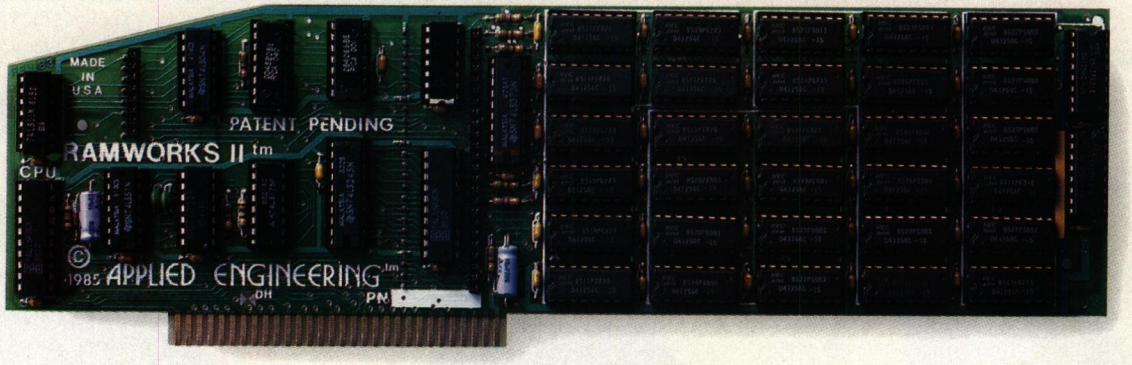
Apple PugetSound Program Library Exchange

RamWorks II®

The Best Selling, Most Compatible, Most Recommended, Most Expandable Card Available.



64K to 16 MEG! RamWorks II Is Number One.

It's simple, RamWorks II sells the most because it does the most.

The AppleWorks Amplifier.

While RamWorks II is recognized by all memory intensive programs, NO other expansion card comes close to offering the multitude of enhancements to AppleWorks that RamWorks II does. Naturally, you'd expect RamWorks II to expand the available desktop, after all Applied Engineering was a year ahead of everyone else *including Apple* in offering more than 55K, and we still provide the largest AppleWorks desktops available. But a larger desktop is just part of the story. Look at all the AppleWorks enhancements that even Apple's own card does not provide and *only* RamWorks II does. With a 256K or larger RamWorks II, *all* of AppleWorks (including printer routines) will automatically load itself into RAM dramatically increasing speed by eliminating the time required to access the program disk drive. Switch from word processing to spreadsheet to database at the speed of light with no wear on disk drives.

Only RamWorks II eliminates AppleWorks' internal memory limits, increasing the maximum number of records available from 1,350 to over 15,000. *Only* RamWorks II increases the number of lines permitted in the word processing mode from 2,250 to over 15,000. And *only* RamWorks II (256K or larger) offers a built-in printer buffer, so you won't have to wait for your printer to stop before returning to AppleWorks. RamWorks II even expands the clipboard. And auto segments large files so they can be saved on two or more disks.

RamWorks II, nothing comes close to enhancing AppleWorks so much.

The Most Friendly, Most Compatible Card Available.

Using RamWorks II couldn't be easier because it's compatible with more off-the-shelf software than any other RAM card. Popular programs like AppleWorks, Pinpoint, Catalyst, MouseDesk, Howard-Soft, FlashCalc, The Spread Sheet, Managing Your Money, SuperCalc 3a, and MagiCalc to name a few (and *all* hardware add on's like ProFile and Sider hard disks). RamWorks II is even compatible with software written for Apple cards. But unlike other cards, RamWorks II plugs into the IIe auxiliary slot providing our super sharp 80 column text in a completely integrated system while leaving expansion slots 1 through 7 available for other peripheral cards.

Highest Memory Expansion.

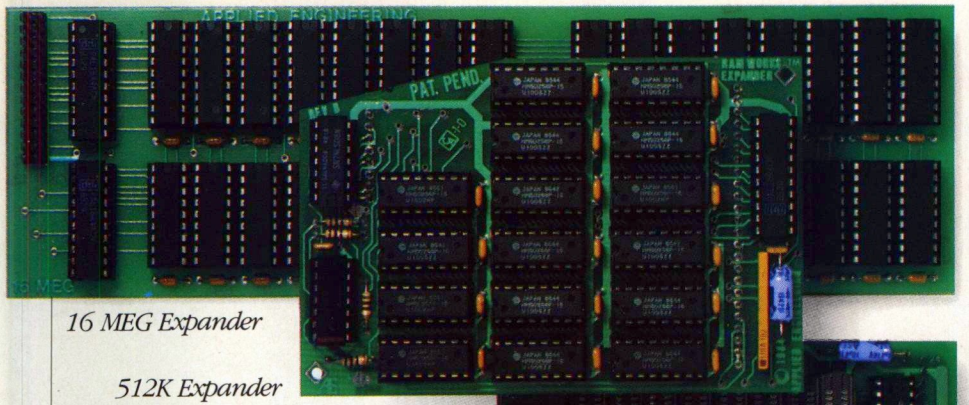
Applied Engineering has always offered the largest memory for the IIe and RamWorks II continues that tradition by expanding to 1 full MEG on the main card using standard RAMs, more than most will ever need (1 meg is about 500 pages of text)...but if you do ever need more than 1 MEG, RamWorks II has the widest selection of expander cards available. Additional 512K, 2 MEG, or 16 MEG cards just snap directly onto RamWorks II by plugging into the industry's only low profile (no slot 1 interference) fully decoded memory expansion connector. You can also choose non-volatile, power independent expanders allowing permanent storage for over 20 years.

It Even Corrects Mistakes.

If you've got some other RAM card that's not being recognized by your programs, and you want RamWorks II, you're in luck. Because all you have to do is plug the memory chips from your current card into the expansion sockets on RamWorks II to recapture most of your investment!

The Ultimate in RGB Color.

RGB color is an option on RamWorks II and with good reason. Some others combine RGB output with their memory cards, but that's unfair for those who don't need RGB *and* for those that do. Because if you don't need RGB Applied Engineering doesn't make you buy it, but if you want RGB output you're in for a nice surprise because the RamWorks II RGB option offers better color graphics plus a more readable 80 column text (that blows away any composite color monitor). For only $129 it can be added to RamWorks II, giving you a razor sharp, vivid brilliance that most claim is the best they have ever seen. You'll also appreciate the multiple text colors (others only have green) that come standard. But the RamWorks II RGB option is more than just the ultimate in color output because unlike others, it's fully



16 MEG Expander

512K Expander

compatible with all the Apple standards for RGB output control, making it more compatible with off-the-shelf software. With its FCC certified design, you can use almost any RGB monitor because only the new RamWorks II RGB option provides both Apple standard and IBM standard RGB outputs (cables included). The RGB option plugs into the back of RamWorks II with no slot 1 interference (works on the original RamWorks, too) and remember you can order the RGB option with your RamWorks II or add it on at a later date.

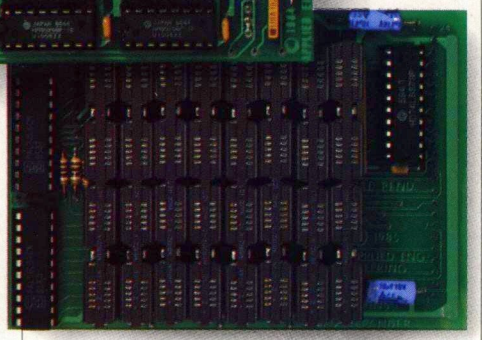
True 65C816 16 Bit Power.

RamWorks II has a built-in 65C816 CPU port for direct connection to our optional 65C816 card. The only one capable of linearly addressing more than 1 meg of memory for power applications like running the Lotus 1-2-3™ compatible program, VIP Professional. Our 65C816 card does not use another slot but replaces the 65C02 yet maintains full 8 bit compatibility.

Endorsed by the Experts.

Steve Wozniak, creator of the Apple Computer said "I wanted a memory card for my Apple that was fast, easy to use, and very compatible; so I bought RamWorks." A+ magazine said "Applied Engineering's RamWorks is a boon to those who must use large files with AppleWorks...I like the product so much that I am buying one for my own system." inCider magazine said "RamWorks II is the most powerful auxiliary slot memory card available for your IIe, and I rate it four stars...For my money, Applied Engineering's RamWorks II is king of the hill."

Apple experts everywhere are impressed by RamWorks II's expandability, versatility, ease of use, and the sheer power and speed that it adds to any IIe. With a RamWorks II in your Apple, you'll make IBM PC's and AT's look like slowpokes.

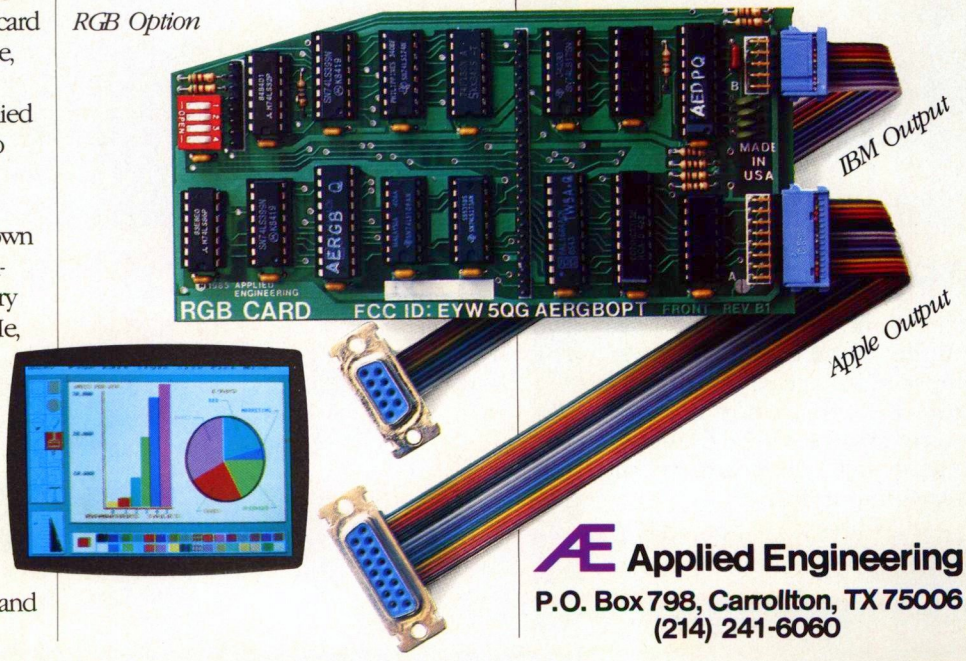


2 Meg Expander

It's Got It All

- 15 day money back guarantee
- 5 year hassle free warranty insures coverage no matter where you purchase
- Built-in super sharp 80 column display, (with or without RGB)
- Expandable to 1 MEG on main card
- Expandable to 16 meg with expander card, with NO slot 1 interference
- Can use 64K or 256K RAMs
- Powerful linear addressing 16 bit coprocessor port
- Automatic AppleWorks expansion up to 3017K desktop
- Accelerates AppleWorks
- Built-in AppleWorks printer buffer
- The only large RAM card that's 100% compatible with all IIe software

RGB Option



- RamDrive™ the ultimate disk emulation software included free
- Memory is easily partitioned allowing many programs to be in memory at once
- Compatible, RGB option featuring ultra high resolution color graphics and multiple text colors, with cables for both Apple and IBM type monitors
- Built-in self diagnostics software
- Lowest power consumption (patent pending)
- Takes only one slot (auxiliary) even when fully expanded
- Software industry standard
- Advanced Computer Aided Design
- Used by Apple Computer, Steve Wozniak and virtually all software companies
- Displays date and time on the AppleWorks screen with any PRO-DOS compatible clock
- Much, much more!

RamWorks II with 64K	**$179**
RamWorks II with 256K	**$219**
RamWorks II with 512K	**$269**
RamWorks II with 1 MEG	**$369**
RamWorks II with 1.5 MEG	**$539**
RamWorks II with 3 to 16 MEG	**CALL**
65C816 16 Bit Card	**$159**
RGB Option	**$129**
256K Upgrade	**$ 50**

RamWorks II. The industry standard for memory expansion of the Apple IIe.

ORDER YOUR RamWorks II TODAY. 9 a.m. to 11 p.m. 7 days, or send check or money order to Applied Engineering.

MasterCard, Visa and C.O.D. welcome. Texas residents add 5⅛% sales tax. Add $10.00 if outside U.S.A.

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Volume 9, Number 7 July 1986

Official Publication of **A.P.P.L.E. Co-op** "People Helping People with Personal Technology".

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ABOUT THE COVER

Catching and holding the microcomputer wave has been Apple Computer's success story for 10 years. Keeping up with the winds of change will be its future challenge. Photo courtesy of Apple Computer, Inc.

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SUMMER SIZZLER SPECIALS!

SUNON COOLING FAN

Product Code: H2T2FN
Shipping Wt: 2 Lbs. 10 Oz.
Member Price: $29.00

Avoid a case of summer computer flakies or meltdown! Well, we haven't really seen the latter, but overheating can be a problem. Attractively styled to match your Apple II + or IIe, this fan effectively carries away the extra heat generated by a full house of peripheral cards. Simply slip the fan down over the cooling slots on your computer. A convenient lighted power switch on the front controls the fan, your Apple, and two outlets for your printer and monitor. A limited surge suppression circuit of the low pass filter type is built in.

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by Migent Software

Product Code: SIBABL
Shipping Wt: 3 Lbs. 0 Oz.
Member Price: $89.00

Ability™ is the integrated six function program (spreadsheet, database, word processor, communications, graphics, and slide presentation) that you may have seen in the Wall Street Journal ads. One of the easiest to learn integrated packages. Makes that desk anchor almost user-friendly.

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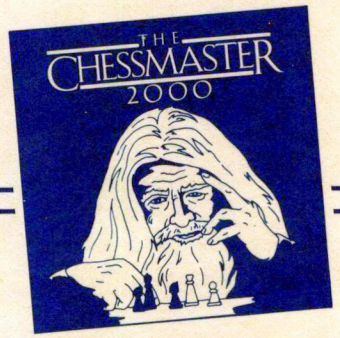
Made by Techmate

Product Code: HTECDR
Shipping Wt: 5 Lbs. 0 Oz.
Member Price: $89.00

This great value in a half-height drive has proven reliable and quiet in our tests.



CHESSMASTER 2000

by Electronic Arts

Product Code: S2CHS
Shipping Wt: 8 Oz.
Member Price: $31.00

Brand new, Chessmaster 2000 is highly rated by the U.S. Chess Federation. 3-D graphics, on-screen chess clock, 12 difficulty levels, teach mode, hint mode. Think mode lets you watch the computer evaluate moves. Even lets you take back moves all the way to the beginning of the game. Classic game library replays 100 of the most famous games in history such as the Kasparov/Karpov Championship and Chessmaster 2000 vs. Sargon III, L.A. CA, 1986.

ZBASIC

by Zedcor

Product Code: S2DZBS
Shipping Wt: 1 Lb.
Member Price: $69.00
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Regular Member
Price: $79.00

We have extended the introductory price on this compiled Basic running under DOS 3.3. Requires IIc or 128K IIe. See the March 1986 review.

CLOSEOUTS

Mocking Board IIc with Music Construction Set

(by Sweet Microsystems)
(by Electronic Arts)

Product Code: H2XXC1
Shipping Wt: 3 Lbs. 8 Oz.
Member Price: $99.00
CLOSEOUT: (While quantities last)

This stereo sound and speech synthesizer was specially designed for use with the Apple IIc.

SpellWorks™

from Advanced Logic Systems

Product Code: SSW
Closeout Price: $24.00
Ship Wt: 2 Oz.

(While Quantities Last)

Spelling checker and mail merge program for AppleWorks™.

Note: We regret that the FischerTechnik Robot Kit is no longer available. The international currency exchange has forced this out of our market.

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7/86

Beagle Bros Apple® Software Report

Ad Number 252 — *"All the News That Fits"* — *Spring 1986*

TRIPLE-DUMP

Print any Apple image on your dot-matrix printer.

Use Triple-Dump with any Apple II and your dot matrix (graphics capable) printer to print:

- Hi-Res graphics
- Double Hi-Res graphics
- Lo-Res graphics
- Double Lo-Res graphics
- 40-Column text
- 80-Column text

Make "hard copies" of all kinds of images with absolutely no programming knowledge.

Or, if you're a programmer, use Triple-Dump's print routines in your own Applesoft programs.

Triple-Dump offers many special graphics effects options such as picture cropping, rotating and magnifying, plus the ability (on many printers) to adjust the print density.

BIG BANNERS TOO: Triple-Dump puts your printer to work making giant-letter 8½"-high signs for all occasions.

$39.95 *Unprotected, ProDOS and DOS 3.3 Compatible with any Apple II Written by Mark Simonsen and Rob Renstrom*

SHAPE MECHANIC

Hi-res shape animation and fancy hi-res typefaces

Shape Mechanic converts your hi-res drawings into "shape tables" so you can create title screens, charts and animation with Apple's built-in *Draw* and *Xdraw* commands. "List and Learn" demos on the Shape Mechanic disk teach you how to create your own hi-res programs.

HI-RES TYPE: 30 proportionally spaced hi-res screen display fonts (both large and small) are included on the Shape Mechanic disk. Each character may be redrawn as you choose.

SHADOW OUTLINE CHOMP
MOD & COMPUTE SKINNY
FATSO L.E.D. EMBOSSE
Penman BROADWAY BDW
SQUARE 200L00

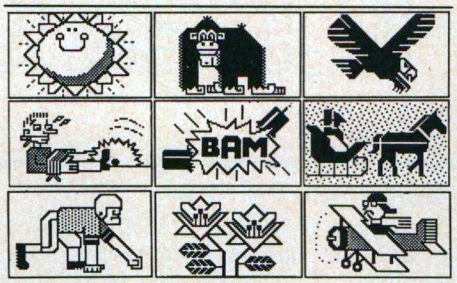
Shape Mechanic's new "SHAPE CAPTURE" feature lets you convert a section of any normal hi-res picture into a shape table.

No fee required to use Shape Mechanic's fonts & routines in programs that you sell. Just credit Beagle Bros in your program and manual.

$39.95 *Unprotected, ProDOS and DOS 3.3 Compatible with any Apple II Written by Bert Kersey and Mark Simonsen*

MINIPIX Disk#1

200 pictures for The Print Shop™ and other graphics programs



Here are 200 copyright-free pictures on disk, for you to use with the most popular Apple graphics programs, including...

- **The Print Shop**
- **MousePaint**
- **Shape Mechanic**
- **Alpha Plot**
- **Apple Mechanic**
- **Beagle Graphics**

...and almost any other Apple graphics program that deals with unprotected hi-res pictures.

Attention, PRINT SHOP owners!

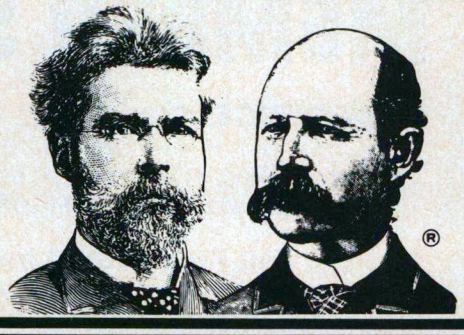
Use Minipix pictures straight from the Minipix disk on your greeting cards, banners and signs. And now you can convert part of *any* normal hi-res picture into Print Shop format! And use Minipix's picture editor to create special graphics effects like instant mirror images, negatives, distortions and blowups:

1. Normal
2. Mirror
3. Negative

MousePainters can load Minipix directly from the disk. *Alpha Plotters* can "clip" Minipix off the screen and "paste" them onto their own pictures. *Shape Mechanic* and *Apple Mechanic* fans can use Minipix in shape table format.

$29.95 *Unprotected, ProDOS and DOS 3.3 Compatible with any Apple II Minipix pictures by Fred and Sara Crone*

"The Print Shop" is a trade mark of Broderbund Software, Inc.



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BEAGLE GRAPHICS

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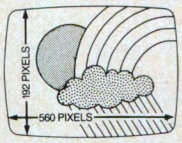
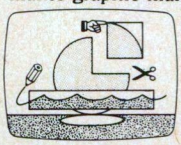


Beagle Graphics lets you use your 128K Apple to draw and label impressive double hi-res images (up to 560 pixels horizontally) using the Apple keyboard or, optionally, a joystick, AppleMouse, Koala Pad or Graphics Tablet.

And you can display *16 hi-res colors* with over 200 color-mixes and fast area "color fills".

A **Variety of Typestyles** is included for labeling double hi-res pictures and charts.

Beagle Graphics' CUT AND PASTE feature makes graphic manipulations a snap—Any picture section may be individually altered or relocated to a new position on the screen. Or onto a completely different picture!

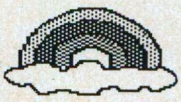


...OR FOR THE PROGRAMMER

You get 33 new commands for drawing, filling and manipulating double-res images. You can convert normal hi-res programs and pictures into double hi-res, save and load any image section, compress picture data to 1/3 disk space, produce double hi-res "slide shows" and more.

READ THE REVIEWS: *Family Computing,* Feb. 86, gives its highest rating (★★★★) to Beagle Graphics in $-Value, Graphics Quality, Documentation and Overall Performance.

$59.95 *Unprotected, ProDOS and DOS 3.3 Compatible with any Apple IIc or 128K IIe Written by Mark Simonsen*



```
]LIST
10 HGR2: CLEAR: ONERR GOTO 10
20 P=1+(P=1): POKE 49238-P,Z
30 POKE 230,32* P: POKE 28,C
40 CALL-3082: POKE 49235+P,Z
50 C=C+1: GOTO 20
```

FONT MECHANIC

30 new hi-res typefaces for Shape Mechanic (and Apple Mechanic)

Font Mechanic's fonts work with all of the programs on Shape Mechanic and Apple Mechanic:

Old English CRATE FINE
ZEBRA UNCLE BRANDING
Caesar HOLLYWOOD
BELLS SANDWICH TIMES
U.S. OPEN EDISON
COUNTDOWN ROOSEVELT

FONT UTILITIES: Font Mechanic lets you convert fonts from other disks (DOS Tool Kit, the Penguin disks, etc.) into fonts for Shape Mechanic and Apple Mechanic. Distort fonts too (s-t-r-e-t-c-h, COMPRESS, etc.) for hi-res copy-fitting and special effects.

$29.95 *Unprotected, ProDOS and DOS 3.3 Compatible with any Apple II Written by Mark and Jon Simonsen*

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Call-A.P.P.L.E. (ISSN 8755-4909) is published monthly by Apple PugetSound Program Library Exchange, 290 S.W. 43rd Street, Renton, Washington 98055, (206) 251-5222. Basic subscription price is $21 per year. Membership in A.P.P.L.E. Co-op, which includes magazine subscription, is $26 per year plus a one-time $23 application fee. Additional postage is required for First Class or foreign delivery.

Second-class postage paid at Renton, Washington, and at additional mailing offices. POSTMASTER: Send address changes to *Call -A.P.P.L.E.*, Address Change, 290 S.W. 43rd St., Renton, Washington 98055.

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Printed in U.S.A.

The INNER CIRCUIT

Don Elman

Going with the Flow

Having been spawned in the state that established surfing as a national pastime, Apple Computer, Inc. has experienced both rising and falling tides during its brief existence. The company rose to its first peak from the legendary garage-factory beginnings in 1976 to the public stock offering as a multi-million-dollar corporation in 1980. For the next three years, Apple struggled to fight off waves of market competition from above (IBM), below (Commodore), and to the side (Franklin), while trying to avoid the undertow of its own sinking creations (Apple *III* and Lisa).

After losing the driving energy of its chief engineer (Woz), the company surged ahead with two new computers in 1984 (Macintosh and *IIc*), which initially failed to produce the anticipated tidal wave of sales. Nearly capsizing in the corporate turbulence of mid-1985, when it seemed that even Steve Jobs doesn't walk on water, Apple appears now to have charted its course through calmer seas with a steadier hand (Sculley) at the helm. The ripples of Macintosh's trend-setting interface continue to spread through the microcomputer industry, as Apple works to streamline and strengthen its vessels. Who knows how soon the wave's crest will break, but in the spirit of the moment we invite you to hang on for the ride.

In This Issue

It may not have the thrill of wind surfing, but Sean Nolan's **Stepping Lightly Through ProDOS** provides a solid utility for examining ProDOS machine code as you put it through its paces. **Slot Saver Clock Driver**, by Ken Kashmarek, may help to squeeze the last drop of space from your overcrowded expansion slots. Wrapping up his current 3-part series on spreadsheet template construction, Jeffrey Jacques presents a "net worth assessment" application that takes into account both liquid and non-liquid assets.

Diving into the language pool, we present a review of Olympic-caliber **Kyan Pascal** by Michael Fink; and this month's installment of Michael and Lisa Storrie-Lombardi's **Silicon Intelligence** focuses on the programming languages used in artificial intelligence. All this, plus our often-splashy columns, departments, and letters, should help to keep your computer afloat until the next issue.

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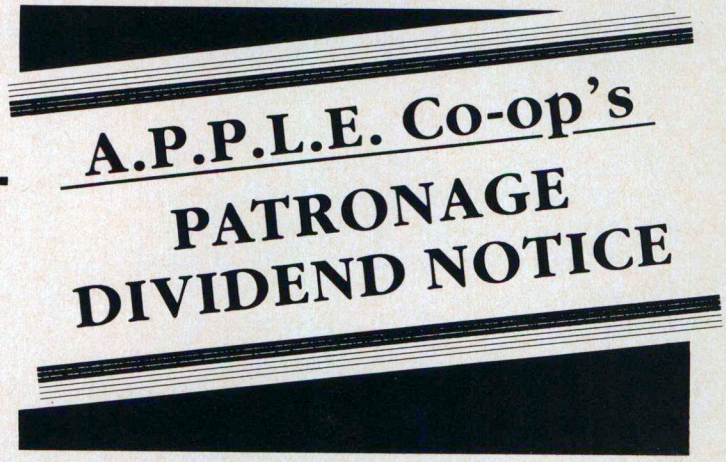
A.P.P.L.E. Co-op Declares 3% Patronage Dividend

The AP.P.L.E.Co-op Board of Directors approved a three percent (3%) member dividend to be declared as of June 1, 1986 for purchases made between April 1, 1985 and March 31, 1986. The dividend can be applied to purchases through January 1, 1987 and, after that, a payment by check can be requested. Dividends not cashed by June 1, 1987 return to the Co-op. Notices are scheduled to be mailed in July.

The Dividends of Diversification

Local members who read our monthly meeting announcements have probably noticed the recent broadening of A.P.P.L.E. Co-op's scope beyond the range of Apple Computer products. For example, we now have active special interest groups (SIG's) devoted to both Amiga and MS-DOS support which meet here each month. Amiga owners who join the Co-op have the option of receiving an Amiga-specific magazine (from another publisher) in place of *Call -A.P.P.L.E.* or *Mac A.P.P.L.E.*. In response to growing demand, we carry a selection of MS-DOS and Amiga software, and are beginning to sell both Amiga and MS-DOS-compatible computers over



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Just as the enthusiasm of our Mac/Lisa SIG led to the launching of a second magazine, we ask for your guidance as we test even newer waters. Specifically, we would like to know how you feel about introducing editorial coverage of MS-DOS computers in either or both of our magazines. Also, we'd appreciate your thoughts about carrying products in our store and/or catalog for non-Apple machines. Surprisingly, sales of Macintosh software have not been overwhelming (even on Mac SIG meeting nights), so we have learned to proceed cautiously. Please let us have your feedback.

On the Road in '86

Since the vast majority of our members are spread across the country, we enjoy every opportunity to meet you in person near your home. A.P.P.L.E. Co-op will send representatives to the following two MacWorld Expositions, and we cordially invite you to come see us at our booths and bring your friends. There will be specials for all Co-op members, not just Macintosh owners.

August 14-16, 1986	Boston	Bayside Expo Center
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Reader of Choice

Tom Feller of Milwaukee, Wisconsin was the lucky member whose Reader's Choice card was drawn at the last Co-op meeting. He receives a $100 credit toward the purchase of products sold by A.P.P.L.E. Co-op.

WANTED: FOR PUBLICATION

We are thinking of including a "Coming Events" section in the magazine for conferences, trade shows, meetings, etc., that would have a broad regional, national, or international interest among Apple users. Please send details at least 2 or 3 months in advance to our Editorial Office.

We are also looking for well-written, timely reviews and tutorials on current software, hardware, and programming languages. Products sold through A.P.P.L.E. Co-op, or advertised in Apple-specific magazines, would be of particular interest to our readers.

Stepping Lightly through ProDOS

Sean Nolan

HERE is a utility program that lays bare the inner workings of ProDOS. It lets you watch machine-language calls to the ProDOS machine-language interface (MLI) as they are made. If you're writing your own machine language programs, you can use it as a powerful debugging tool. You can also use it to step through commercial ProDOS programs. With it I've stepped through the Merlin Pro assembler and Apple Writer and have seen how they use ProDOS low-level commands.

I call it the ProDOS Wedge. What it does, quite simply, is display ProDOS MLI calls as they are made. The program making these calls does not have to be modified. It will not be "aware" that are you are watching it's inner workings. Every time the program calls the ProDOS MLI, the address of the code that is calling ProDOS and the MLI command number (more about these later) will be printed in the lower-left hand corner of the screen. After you press a key, the screen will be restored and the calling Program will continue.

Wedges

Before I detail how the wedge works, I should explain a bit about wedges in general and ProDOS MLI calls. A wedge is a routine, usually in machine language, which intercepts some process in your Apple in order to modify the process it's intercepting. Let me be more specific.

The best-known wedges in the Apple II are the so-called DOS hooks. Every time a program needs to get a key from the keyboard or send a character out to the video display, a standard routine in ROM is called. The routine for displaying a character begins like this:

```
$FDED-JMP  ($0036)
$FDF0-CMP  #$A0
$FDF2-BCC  $FDF6
```

and continues on. The first instruction, at $FDED, jumps indirectly through the address stored in zero page locations $36 and $37. On an Apple II that has just been turned on, these addresses point to $FDF0, the next instruction of the character output routine in ROM. So why bother? The indirect jump command seems to accomplish nothing.

The code was written that way so that by changing the address in $36 and $37, a different character output routine of your own design can be called automatically every time a program calls the standard ROM routine at $FDED. DOS 3.3 and ProDOS take advantage of this feature in order to keep an eye on what's happening in your Apple II.

DOS 3.3 points both the character input hook at $38 and $39 and the character output hook at $36 and $37 into routines in DOS 3.3. These routines examine the stream of characters from the keyboard and to the screen, and act when they see something relevent to them. The DOS 3.3 character output routine, for example, reacts drastically if it sees the characters RETURN, control-D, "C," "A," "T", "A," "L," 'O," and "G" pass through it's character output wedge. ProDOS is a little trickier, but the same principle applies.

If the characters being output have nothing to do with DOS, the operating system dutifully passes them on to the ROM routine at $FDED. The result is a perfect wedge: character output usually proceeds as if DOS wasn't there at all. The operating system is given a chance to execute new functions (such as CATALOGing) during character output while allowing character output to still proceed smoothly.

3.3. Forget the fact that ProDOS is faster, can access hard disks, and supports subdirectories. These features wither in the brilliance of the ProDOS MLI. ProDOS's great advantage is the ease with which you can do disk commands from machine language. The MLI makes this possible.

The MLI is the only memory address that you need to know in order to read or write to a disk from machine language. All twenty-six low-level ProDOS commands are accessed through this one vector. How can ProDOS know which of it's myriad functions you're requesting? It tells by looking at the byte following the JSR (a machine-language GOSUB) to the MLI. Here, for example, is how you rename a file from machine language:

```
JSR  $BF00        ; this calls the ProDOS MLI
DFB  $C2          ; this is the command number ($C2
                    = rename)
DA   PARAMLIST    ; put the address of the parameter
                    list here.
                  ; The parameter list for this com-
                    mand will
                  ; determine both the old and the
                    new filename.
BCS  ERROR        ; execution resumes here after Pro-
                    DOS.
```

$BF00 is the documented entry point to the ProDOS Machine Language Interface. It jumps to a secondary MLI entry point at $BFB7. Apple has not unconditionally guaranteed that this secondary entry will always be at $BFB7. If it ever changes in a future version of ProDOS, my wedge routine will have to be adjusted accordingly.

The code at $BFB7 throws some soft switches, turns on the language card area of RAM, and then jumps to the MLI parser routine somewhere in darkest ProDOS. This MLI parser looks at the stack in order to figure out where it was called from. Once it knows that, it is able to get the command byte and parameter list address. My ProDOS wedge uses the same trick to get the jump on ProDOS.

The ProDOS Wedge

To install the ProDOS wedge we must both BLOAD it into memory and then point the MLI entry at $BF00 down into page 3 where the wedge resides. BRUNning the wedge accomplishes both goals. Afterwards, any program which tries to call ProDOS will instead call the wedge.

The wedge prints diagnostic information and then jumps to the MLI secondary entry point at $BFB7. If all goes well the ProDOS MLI call will proceed as if nothing had happened.

A complete listing of the ProDOS wedge is presented as Listing 1. It was assembled using the Merlin Pro assembler. Lines 18 through 22 redirect all MLI calls by altering the jump instruction at $BF00.

The actual wedge routine begins at line 28. This is where control jumps every time ProDOS is called. After saving registers its first task is to find out where the JSR $BF00 call was made from. Once this return address is found, it is easy to discover which ProDOS MLI call is being requested. The return address, which points to the 3rd byte of the JSR $BF00 instruction in the program being stepped through, is copied from the top of the stack into zero page locations $3C and $3D. As it is copied it is incremented so that $3C and $3D end up pointing to the actual command byte. $3C and $3D are scrambled during MLI calls, by the way, so there is little danger of a page zero conflict.

Next, seven characters at the lower lefthand corner of the text page are saved. We're going to display our diagnostic info there. Saving the corner first allows the screen to be restored on exit.

Lines 54 to 57 print the address of the command byte. This tells us where the calling program is running. Lines 61 to 63 display the actual command byte. This byte tells us whether a read, write, open, close, or any of a dozen other commands is being requested.

The subroutine BYTEOUT, at lines 102 to 116, is called to print information onto the screen. It closely parallels the monitor routine PRBYTE at $FDDA. The main difference is that it does not use COUT ($FDED) to print the resulting characters. Doing so might endanger the ProDOS MLI call currently underway. Instead I directly POKE the characters into the text page.

The routine now waits for a keypress. It doesn't call the monitor RDKEY routine, because the RDKEY usually passes through a character input wedge, and we can't be certain that a RDKEY wedge would not conflict with the ProDOS wedge. If you type an asterisk "*" at this point, the wedge will drop you into the monitor. This is useful when analyzing programs like Apple Writer that provide no way to get into the monitor. But *beware*! Once you're in the monitor, you're on your own. Entering the monitor may destroy important zero page locations. Control-Reset is your only real hope of getting out again. If the program is properly reset-trapped you might recover. If it isn't you might re-boot.

If you press the ESCape key instead of an asterisk, then the wedge will disconnect itself by restoring the original jump instruction at $BF00. Pressing any other key lets you continue while keeping the wedge active.

Finally, lines 89 to 93 restore the text page, the X and Y registers, and then jump to the ProDOS secondary MLI entry at $BFB7.

Applications

My first task for the ProDOS wedge was to find out what the BASIC.SYSTEM commands really *do*. What, for example, really happens when you type:

VERIFY THIS.FILE

I had assumed that the ProDOS "VERIFY" command checks that the indicated file is whole and healthy. I was dead wrong.

BLOAD the ProDOS wedge, and call 768 to activate it. Now type "VERIFY PRODOS.WEDGE" (any file name will do). The address of the BASIC.SYSTEM routine that calls ProDOS should appear in the lower left hand corner of the screen. Following it should be the hex number C5. C5 is the MLI command number for "ONLINE." In fact, "ONLINE" is executed at the start of every ProDOS command called from BASIC.

Now press a key. The next command number displayed should be hex C4. That's "GET FILE INFO," where ProDOS asks how many disk blocks the file uses, what type it is, and so on. It gets this from reading the catalog. Press another key, and we're done. "VERIFY" has finished it's work without reading a single byte of the file. All it did was to check that the file was listed in the catalog. What a gyp!

The ubiquitous "ONLINE" explains why, when you swap disks, ProDOS commands like "CATALOG" still work without requiring you to set a new PREFIX. If the current prefix is null, then BASIC.SYSTEM does an "ONLINE" every time it accesses the disk. That way it is able to access the same disk drive even after disks have been switched. If a prefix has been defined, however, BASIC.SYSTEM acts differently. It no longer allows you to indiscriminately swap disks. It now looks for the disk whose prefix has been set.

If you want to see lots of action, try stepping through "CAT" or "CATALOG'. Below is a complete list of MLI command numbers to help you make sense of it all:

$40 Allocate interrupt
$41 Deallocate interrupt
$65 Quit
$80 Read block
$81 Write block
$82 Get time
$C0 Create file
$C1 Destroy file
$C2 Rename file
$C3 Set file info

$C4 Get file info
$C5 Online (get disk name)
$C6 Set prefix
$C7 Set prefix
$C8 Open file
$C9 Newline
$CA Read file
$CB Write to file
$CC Close file
$CD Flush file
$CE Set mark in file
$CF Get mark in file
$D0 Get end-of-file (size of file)
$D1 Set end-of-file
$D2 Set (change) buffer address
$D2 Get buffer address

I now make it a point to include the ProDOS wedge in every large machine language program I write. My programs are arranged so that one key (something unlikely to be pressed by accident, such as open-apple-shift-plus) turns on my wedge. I now have a resident ProDOS debugger which is always there when I need it.

I would like to propose two standard debugging commands. Open-apple-asterisk should send you to the monitor, and open-apple-plus should turn on the ProDOS wedge.

You can use the wedge to examine how almost any ProDOS program uses the MLI. I've used it to step through both the 128K Apple Writer and the Merlin Pro assembler. Assembled at $300, the wedge works fine with Merlin. In order to step through my 128K Apple Writer, however, I had to reassemble the wedge at $9000. In theory, any program which leaves half a page free somewhere can be stepped through with the wedge. The only tricks are finding where to put it, and sometimes how to get it there.

Going from one system program to another (such as from Apple Writer to BASIC.SYSTEM) with the wedge active is always fraught with danger. I was able to step through Apple Writer by BRUNing a $9000 version of the wedge from BASIC, and then calling Apple Writer through the quit code. The wedge worked fine, and I could see every MLI call that Apple Writer made. But when I quit back to BASIC.SYSTEM again everything died. The wedge, which was still active, was overwritten by BASIC.SYSTEM. Suddenly all MLI calls were sent into a black hole. I could have avoided this had I turned off the wedge from within Apple Writer by typing ESCape.

Improvements

One nice additional feature would be to display the error code returned by each ProDOS MLI call. Every MLI call returns with an error number in the accumulator. If it is zero, no error occurred. There are thirty MLI error codes, and they are often more specific than the BASIC.SYSTEM error numbers you access by PEEK(222). "I/O ERROR," for example, could be caused by any of ten ProDOS MLI errors. I can see two ways to add an error display to the wedge. One is to JSR instead of JMP to the MLI code from the wedge, and then print the resulting error number. This would require, however, copying both the MLI command number and parameter table address from the calling program into the wedge. The other method would be to intercept MLI calls as they return, rather then as they are called. This method would work only if all MLI calls returned through an exit routine. I believe that ProDOS must have one, since MLI calls returning from the language card bank-switched-RAM must turn ROM on again before they return to the caller.

There you have it. Take the routine and spread it fruitfully. You have my permission to include it freely in your programs. My only request is that if you sell a program which included the wedge during debugging, please leave it in. If we don't include source code with the programs we distribute, we should at least make it easy for hackers to get inside them.

Snapshot and the Art of Apple II Switching

The Snapshot card unleashes your Apple's hidden power to interrupt -and-resume any running program. When you load up Snapshot's on-board RAM with one of Dark Star Systems' growing family of easy-to-use, menu-driven software packs, you get awesome switching power at the press of a button....

Switch 1 The Snapshot Shuttle is an Apple II Switcher that lets you keep up to four different programs where you can access them instantly — in your RAMcard. That means no more waiting for disk I/O. And armed with the Shuttle, you can interrupt a program and resume running it at exactly the same point, so there's no time-wasting search for where you left off. Use the Shuttle to switch among your wordprocesser, database, spreadsheet and comms programs — or *any* applications you like. The Shuttle's great for program development too. It lets you switch among operating systems, from any language to your compiler, editor, assembler or debugger — back and forth between *all* your favorite programming tools in fact.

Switch 2 The Snapshot Printerrupt lets you interrupt *any* running program, print its display using a galaxy of great menu options, and resume running it as though nothing happened. Use it to view and print both MousePaint screens; crop text and graphics; expand graphics; rotate left and right; invert and shade; print Pages 1 and 2 side-by-side, or *and*, *or*, and *xor* them; set dot-density; check the form position; auto-center, and adjust margins — you name it, you can do it with the Printerrupt.

Switch 3 The Snapshot Copykit lets you make archival backups of your copy-protected software. It will copy total-load programs up to 128K in less than 25 seconds, and it's invaluable for backing up multi-access programs too. The Copykit's *fast* saving and loading of total memory saves hours when you need to work with spreadsheets or other programs that take an eternity to handle large files. And the Copykit lets gamesters start the action at those hard-to-reach high levels *every* time!

Switch 4 The Shell is the memory-manager and mini operating system which allows Snapshot software to work within an interrupted program. Use it to write your own machine-code or Basic Snapshot program. It could be a great debugger, a comms program, or even a neat little game. Whatever your Apple's doing, the Shell lets you suspend it and get your program up-and-running at the press of a button.

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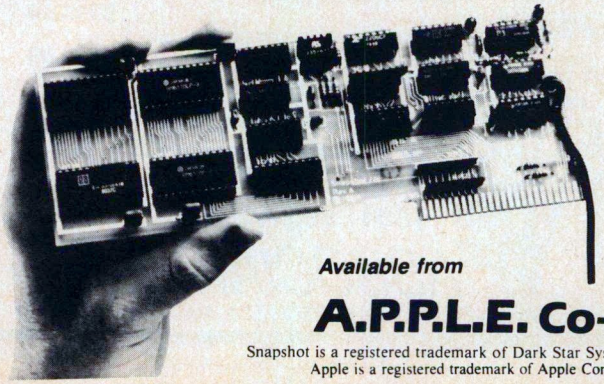

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CIRCLE 16 READER SERVICE CARD

LISTING 1

```
                        1   ******* ProDOS Diagnostic Wedge
                        2
                        3
                        4   A1       =    $3C
                        5   SCREEN   =    $7D0       lower-left corner of text page
                        6   MLI      =    $BF00
                        7   MLI2     =    $BFB7      MLI normally JuMPs to here
                        8   KEYBOARD =    $C000
                        9   STROBE   =    $C010
                        10  MONITOR  =    $FF65
                        11
                        12          ORG   $300
                        13
                        14
                        15  *** connect the wedge
                        16
                        17
0300: A9 0B             18          LDA   #<WEDGE
0302: 8D 01 BF          19          STA   MLI+1
0305: A9 03             20          LDA   #>WEDGE
0307: 8D 02 BF          21          STA   MLI+2
030A: 60                22          RTS
                        23
                        24
                        25  *** Wedge entry point. Point A1 to the command byte
                        26  *** which follows the JSR $BF00 which called us.
                        27
030B: 8A                28  WEDGE   TXA               ;save X and Y
030C: 48                29          PHA
030D: 98                30          TYA
030E: 48                31          PHA
030F: BA                32          TSX               ;look at return address
0310: BC 03 01          33          LDY   $103,X      on the stack.
0313: C8                34          INY               ;inc it by 1 to point to
0314: 84 3C             35          STY   A1          the command byte.
0316: 98                36          TYA               ;save low byte of address
0317: BC 04 01          37          LDY   $104,X
031A: AA                38          TAX               ;if low byte inc'd to 00,
031B: D0 01             39          BNE   :ok         bump high byte
031D: C8                40          INY
031E: 84 3D             41  :ok     STY   A1+1
                        42
0320: A0 07             43          LDY   #7          save 7 bytes from screen
0322: B9 CF 07          44  ]loop   LDA   SCREEN-1,Y
0325: 48                45          PHA
0326: 88                46          DEY
0327: D0 F9             47          BNE   ]loop       exit with Y=0 !
                        48
                        49
                        50  *** print address from where ProDOS was called
                        51  *** and the command byte found there.
                        52
                        53
0329: A5 3D             54          LDA   A1+1        Y-register is used to position
032B: 20 6D 03          55          JSR   BYTEOUT     output across the screen.
032E: A5 3C             56          LDA   A1
0330: 20 6D 03          57          JSR   BYTEOUT     print address of command byte
0333: A9 1C             58          LDA   #$1C        print a backslash
0335: 99 D0 07          59          STA   SCREEN,Y
0338: C8                60          INY
0339: A2 00             61          LDX   #0
033B: A1 3C             62          LDA   (A1,X)      get command byte
033D: 20 6D 03          63          JSR   BYTEOUT     display it
                        64
                        65
                        66  *** Wait for a keypress, restore screen, exit
                        67
                        68
0340: AD 00 C0          69  ]loop   LDA   KEYBOARD    wait for a keypress
0343: 10 FB             70          BPL   ]loop
0345: 8D 10 C0          71          STA   STROBE
0348: C9 AA             72          CMP   #"*"        if asterisk pressed,
034A: D0 03             73          BNE   :a          crash in the monitor
034C: 4C 65 FF          74          JMP   MONITOR
                        75  :a
034F: C9 9B             76          CMP   #$9B        if escape pressed
0351: D0 0A             77          BNE   :b          disconnect the wedge
0353: A9 B7             78          LDA   #<MLI2
0355: 8D 01 BF          79          STA   MLI+1
0358: A9 BF             80          LDA   #>MLI2
035A: 8D 02 BF          81          STA   MLI+2
                        82  :b
035D: 68                83  ]loop   PLA               ;restore 7 characters to
035E: 9D D0 07          84          STA   SCREEN,X    screen. X=0 on entry.
0361: E8                85          INX
0362: E0 07             86          CPX   #7
0364: D0 F7             87          BNE   ]loop
                        88
0366: 68                89          PLA               ;restore X and Y
0367: A8                90          TAY
0368: 68                91          PLA
0369: AA                92          TAX
036A: 4C B7 BF          93          JMP   MLI2        jump to original ProDOS MLI
target
                        94
                        95
                        96  *** BYTEOUT routine. Similar in function to the monitor
                        97  *** routine at $FDDA, except that it pokes inverse
                        98  *** characters directly into the text page rather then
                        99  *** calling COUT.  The Y-register is used as an HTAB index.
                        100
                        101
036D: 48                102 BYTEOUT PHA
036E: 4A                103         LSR
036F: 4A                104         LSR
0370: 4A                105         LSR
0371: 4A                106         LSR
0372: 20 76 03          107         JSR   NYBBOUT     put hex digit on screen at Y-th
character
0375: 68                108         PLA
0376: 29 0F             109 NYBBOUT AND   #$0F
0378: 09 30             110         ORA   #$30        make it inverse
                        111         CMP   #$3A
037C: 90 02             112         BCC   :a
037E: E9 39             113         SBC   #$39        not ADC #6, avoids mousetext
0380: 99 D0 07          114 :a      STA   SCREEN,Y
0383: C8                115         INY
0384: 60                116         RTS

--End assembly, 133 bytes, Errors: 0
```


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CIRCLE 30 READER SERVICE CARD

Slot Saver Clock Driver

Ken Kashmarek

IS your Apple II computer like mine, with very few or no empty slots? Has this kept you from buying the latest and greatest new device? Without an empty slot, is the UniDisk 3.5 just a dream? Are you interested in Apple Mouse software, but do not have an empty slot for the Apple Mouse hardware? If so, welcome to the world of a fully loaded Apple II.

A possible answer to this problem is a multifunction board. I started out with the Versacard multifunction board. Most of the multifunction boards for the Apple II are very good, but, like the Versacard, need phantom slots to address the devices. Phantom slots take up real slot assignments. On the enhanced *//c*, the Apple UniDisk 5.25 inch drive can be daisy chained off the back of a UniDisk 3.5 inch drive. However, in their infinite wisdom, Apple Computer did not implement the UniDisk 3.5 controller board for the *//e* with the capability to handle this same situation.

There are various solutions which will provide relief for an Apple II with full slots. Many of these solutions involve buying additional or different hardware. I have one solution which does not require new hardware. My solution provides new software for the Versacard multifunction board. The Versacard is made by Prometheus. This card supports a serial port (addressed by the slot in which the board is installed), a parallel port (phantomed to an empty slot), a clock port (phantomed to another empty slot), and a BSR interface (same slot as the serial port). I do not use the parallel port or the BSR interface. However, I do use the serial port for my Hayes Smartmodem 1200. ProDOS used the clock port via the Thunderclock interface.

When I bought the UniDisk 3.5, I had to remove my Apple Mouse. However, I want to use several packages that make use of the mouse. I have been able to free up a slot for the mouse by replacing the ProDOS clock driver with my own clock driver for the Versacard clock. With this change, I can continue to use the clock without the phantom slot assignment. This is done by accessing the clock I/O ports directly on the Versacard multifunction board.

ProDOS Technical Note #10 provides information for installing your own clock card driver. The replacement clock driver routine can be 125 bytes long. A clock driver must get the clock values from the clock I/O port and place the data into the ProDOS global page at locations $BF90 through $BF93. The clock routine in the ProDOS kernel is at $D742 in the first 4K RAM bank of the language card memory. At boot time, ProDOS will place an RTS instruction ($60) in location $BF06 if a Thunderclock compatible card is not found. Locations $BF07 and $BF08 contain the value $D742 (ProDOS Version 1.1.1). After installing a clock routine, the RTS instruction is changed to a JMP instruction ($4C).

The Versacard Clock Port

The standard ProDOS clock driver accesses the clock through the Thunderclock compatible interface. This needs a slot assignment to reach the on-board clock code in the ROM. The Versacard clock can also be accessed without the phantom slot assignment. The actual clock I/O ports are available through the physical slot address of the card. The clock control port is accessed using LDA $C082,Y with the Y register containing $n0 where 'n' is the slot number. The clock data port is accessed using LDA $C083,Y (either access may be with STA for changing data).

On my Apple II computer, the Versacard is installed in slot 2. The control port can be directly addressed as memory loca-

tion $C0A2 and the data port can be addressed as memory location $C0A3 (index register not needed). Data for the date and time values are taken directly from the clock data port and placed in the ProDOS global page.

The ProDOS Global Page Locations

The date value locations are $BF90 (low byte) and $BF91 (high byte). The definition for the 16 bits is:

The time value locations are $BF92 (low byte) and $BF93 (high byte). The definition for the 16 bits is:

ProDOS executes the GET TIME MLI call to update these locations whenever an updated clock value is needed (usually during file operations).

Note the layout of the two words for date and time. The date word ($BF90-$BF91) can be stored as data in a file. The file can be sorted on this field to obtain chronological ordering of data (by date). The same is true for the time word ($BF92-$BF93). The two words can be treated as a single 32 bit field for sorting by date and time (logical order of data bytes from most significant to least significant: $BF91, $BF90, $BF93, $BF92).

The Versacard Clock Driver

Accessing data from the clock port is a two step process. First, a control byte is written (stored) to the clock control port. The control byte must have the read bit set and contain the address of the data item that is needed. This is documented in the VERSACARD CLOCK DRIVER program listing. After the control byte is stored, the data value is read (loaded) from the clock data port. Hour and minute are stored directly into their respective locations in the ProDOS global page. Year, month, and day need a small amount of bit manipulation to get the values into the correct bit positions.

Since we are not using the on-board ROM, this code must support interrupts for the clock. Interrupt support is handled by extracting the interrupt status of the clock (enabled or disabled; bit 5 of the data byte loaded from the data port). This status is saved and then restored to maintain proper clock operation. See routines READDATA and ENABLE in the clock driver program listing.

The Versacard clock driver is 124 bytes long. It is installed as part of my STARTUP program. Location $BF06 is checked for an RTS instruction. If found, the clock driver module is executed. The first 29 bytes move the code to overlay the clock driver memory locations in the language card. The RTS in the global page is then replaced with a JMP instruction. After your STARTUP program is modified, you must then disable the phantom slot address by setting the dip switches on the Versacard controller board (labeled CLK). The new address must be the same as the physical slot that the board occupies (see your Versacard documentation). Your former phantom slot is now available to be used for a different device interface card.

You can replace the current clock driver at any time by simply BRUNing the VERSACARD CLOCK DRIVER module. Be sure to examine the date and time locations before and after installing the new driver. Then issue a CAT command to force ProDOS to make a clock card call. Check the date and time locations to be certain they represent what you expect. Note that the time value only changes once each minute (location $BF92).

One significant attribute of this routine is that the year is always correct. The standard ProDOS driver sets the year via a table that will run out January 1, 1988. The Versacard clock driver routine always gets the correct year from the Versacard clock (provided that it is set correctly).

Once the Versacard clock driver is assembled (with Merlin Pro), it can be installed using the sample Applesoft clock driver demonstration program.

Before making the changes suggested in this article, be certain your clock is set correctly. When you remove the phantom slot, the clock values can no longer be set since the on-board ROM is no longer available.

```
                        1  *-------------------------------------------*
                        2  *      VERSACARD CLOCK DRIVER FOR PRODOS
                        3  *            BY KEN KASHMAREK
                        4  *         ASSEMBLED WITH MERLIN PRO
                        5  *-------------------------------------------*
                        6  * Routine to replace ProDOS clock driver for use
                        7  * with Versacard multifunction controller board.
                        8  * Allows clock access without phantom slot address
                        9  * (set clock address to serial port slot number on
                        10 * dip switches).
                        11 *-------------------------------------------*
                        12 YRTENS   EQU   $1C       ADDRESS VALUE + READ BIT
                        13 DATETIME EQU   $BF06     JMP $D742  or  RTS
                        14 CLOCK    EQU   $D742     IN PRODOS 1.1.1
                        15 DATE     EQU   $BF90     PRODOS GLOBAL PAGE
                        16 TIME     EQU   $BF92     PRODOS GLOBAL PAGE
                        17 *-------------------------------------------*
                        18 * MOVE THE DRIVER CODE FOR PAGE 3 TO $D742. ALL
                        19 * ADDRESSES ARE ALREADY ASSEMBLED CORRECTLY BY
                        20 * MERLIN PRO USING THE SECOND ORG INSTRUCTION.
                        21 *-------------------------------------------*
                        22          ORG   $0300
0300: AD 8B C0          23          LDA   $C08B     WRITE ENABLE
0303: AD 8B C0          24          LDA   $C08B       LANGUAGE CARD
0306: A0 7C             25          LDY   #DRIVERND-DRIVER MODULE LENGTH
0308: B9 1C 03          26 LOOP     LDA   NEWCLOCK-1,Y PICK A CODE BYTE
030B: 99 41 D7          27          STA   $D742-1,Y    STORE IN PRODOS
030E: 88                28          DEY
030F: D0 F7             29          BNE   LOOP      ->'TILL DONE
0311: A9 4C             30          LDA   #$4C      REPLACE RTS WITH
0313: 8D 06 BF          31          STA   DATETIME    JUMP INSTRUCTION
0316: 20 06 BF          32          JSR   DATETIME  INITIALIZE CLOCK
0319: 8D 82 C0          33          STA   $C082     RESET LANGUAGE CARD
031C: 60                34          RTS             ;ALL DONE
                        35 NEWCLOCK EQU   *
                        36 *-------------------------------------------*
                        37          ORG   $D742
D742: 08                38 DRIVER   PHP             ;SAVE STATUS
D743: 78                39          SEI             ;INHIBIT INTERRUPTS
D744: 20 AF D7          40          JSR   ENABLE    ENABLE THE CLOCK
D747: 58                41          CLI             ;ENABLE INTERRUPTS
D748: A2 1D             42          LDX   #YRTENS+1 SET READ DATA BIT PLUS
D74A: 20 7C D7          43          JSR   READFOUR  YEAR TENS CODE + 1
D74D: 8D 91 BF          44          STA   DATE+1            C X X X X M M M M
D750: 20 7C D7          45          JSR   READFOUR  MONTH   0 0 0 0 0 M M M M
D753: 6A                46          ROR             ;       M 0 0 0 0 0 M M M
D754: 6A                47          ROR             ;       M M 0 0 0 0 0 M M
D755: 6A                48          ROR             ;       M M M 0 0 0 0 0 M
D756: 6A                49          ROR             ;       M M M M 0 0 0 0 0
D757: 8D 90 BF          50          STA   DATE      AND SET ACROSS
D75A: 2E 91 BF          51          ROL   DATE+1      TWO BYTES.
D75D: 20 75 D7          52          JSR   READTWO   DAY OF MONTH
D760: 0D 90 BF          53          ORA   DATE      MERGE WITH MONTH
D763: 8D 90 BF          54          STA   DATE
D766: CA                55          DEX             ;SKIP DAY OF WEEK
```

```
D767: 20 75 D7   56            JSR   READTWO   HOUR
D76A: 8D 93 BF   57            STA   TIME+1
D76D: 20 7C D7   58            JSR   READFOUR  MINUTES
D770: 8D 92 BF   59            STA   TIME
D773: 28         60            PLP               ;RESTORE STATUS
D774: 60         61            RTS               ;RETURN
                 62  *-------------------------------------------*
                 63  * ROUTINES TO PROCESS TWO OR FOUR CLOCK DATA BITS.
                 64  *-------------------------------------------*
                 65  TEMP      EQU   $3A
D775: 20 8E D7   66  READTWO   JSR   READDATA
D778: 29 03      67            AND   #%00000011 NEED TWO BITS
D77A: 90 03      68            BCC   CONTINUE  LET IT FINISH HOUR
D77C: 20 8E D7   69  READFOUR  JSR   READDATA  TAKE ALL FOUR BITS
D77F: 0A         70  CONTINUE  ASL               ;MULTIPLY BY 2
D780: 85 3A      71            STA   TEMP        SAVE FOR LATER ADDITION
D782: 0A         72            ASL               ;TIMES 4 MORE
D783: 0A         73            ASL               ;AND CARRY IS CLEAR
D784: 65 3A      74            ADC   TEMP        ADD TO GENERATE
D786: 85 3A      75            STA   TEMP        10 TIMES THE DIGIT
D788: 20 8E D7   76            JSR   READDATA  GET UNITS DIGIT
D78B: 65 3A      77            ADC   TEMP        ADD 1OS DIGIT
D78D: 60         78            RTS
                 79  *-------------------------------------------*
                 80  *     ADDRESS   | FUNCTION |     DATA      | RANGE
                 81  * A3 A2 A1 A0 |          | D3 D2 D1 D0 |
                 82  * 0  0  0  0   SECONDS1     *  *  *  *    0-9      1
                 83  * 0  0  0  1   SECONDS10       *  *  *    0-5      1
                 84  * 0  0  1  0   MINUTES1     *  *  *  *    0-9
                 85  * 0  0  1  1   MINUTES10       *  *  *    0-5
                 86  * 0  1  0  0   HOURS1       *  *  *  *    0-9
                 87  * 0  1  0  1   HOURS10      +  +  *  *    0-1/0-2 2
                 88  * 0  1  1  0   WEEKDAY         *  *  *    0-6 0=SUN
                 89  * 0  1  1  1   DATE1        *  *  *  *    0-9
                 90  * 1  0  0  0   DATE10         +  *  *    0-3      3
                 91  * 1  0  0  1   MONTH1       *  *  *  *    0-9
                 92  * 1  0  1  0   MONTH10            *  *    0-1
                 93  * 1  0  1  1   YEAR1        *  *  *  *    0-9
                 94  * 1  1  0  0   YEAR10       *  *  *  *    0-9
                 95  * 1  1  1  1   INTERRUPT    d  c  b  a              4
                 96  *
                 97  * Notes: *=VALID DATA BIT, +=SPECIAL DATA BIT.
                 98  *        1. WHEN WRITTEN, SECONDS COUNTERS SET=00
                 99  *        2. D2=AM/PM (PM=1) D3=24 HOUR (1=24)
                100  *        3. D2=LEAP YEAR (1=29 DAYS IN FEB). RESET
                101  *           BY CLOCK ON MARCH 1.
                102  *        4. INTERRUPT FREQUENCIES
                103  *           a = 1024 HERTZ
                104  *           b = 1 PULSE PER SECOND
                105  *           c = 1 PULSE PER MINUTE
                106  *           d = 1 PULSE PER HOUR
                107  *-------------------------------------------*
                108  *           BIT   7   6   5   4   3   2   1   0
                109  * CONTROL        BSR INT  WR  RD  A3  A2  A1  A0
                110  * DATA WRITE      X   X   X   X  D3  D2  D1  D0
                111  * DATA READ       X   X  INT BSY  D3  D2  D1  D0
                112  *-------------------------------------------*
                113  CLOCKSL   EQU   2           VERSACARD PHYSICAL SLOT
                114  CLOCKWR   EQU   CLOCKSL*16+$C082 CLOCK CONTROL PORT
                115  CLOCKRD   EQU   CLOCKSL*16+$C083 CLOCK DATA, STATUS
                116  *
D78E: AD A3 C0  117  READDATA LDA   CLOCKRD    GET CLOCK STATUS
D791: 29 0F     118           AND   #%00001111 ISOLATE
D793: 49 07     119           EOR   #%00000111 PENDING INTERRUPT
D795: D0 F7     120           BNE   READDATA  ->IF PENDING
D797: 78        121           SEI               ;DISABLE INTERRUPT
D798: AC A3 C0  122           LDY   CLOCKRD    READ INTERRUPT STATUS
D79B: CA        123           DEX               ;SET CLOCK DATA ADDRESS
D79C: 8E A2 C0  124           STX   CLOCKWR      TO CONTROL PORT
D79F: AD A3 C0  125           LDA   CLOCKRD    GET CLOCK DATA VALUE
D7A2: 29 0F     126           AND   #%00001111 USE 4 BITS ONLY
D7A4: 48        127           PHA               ;SAVE CLOCK DATA VALUE
D7A5: 20 B5 D7  128           JSR   CLKWRITE   SET CLOCK STATUS
D7A8: 98        129           TYA               ;GET INTERRUPT VALUE
D7A9: 20 B2 D7  130           JSR   INTERUPT   RESET INTERRUPTS
D7AC: 68        131           PLA               ;CLOCK DATA VALUE
D7AD: 58        132           CLI               ;ENABLE INTERRUPTS
D7AE: 60        133           RTS
                134  *-------------------------------------------*
D7AF: AD A3 C0  135  ENABLE    LDA   CLOCKRD    GET CLOCK STATUS
D7B2: 29 20     136  INTERUPT  AND   #%00100000 ISOLATE INTERRUPT STATUS
D7B4: 0A        137           ASL               ;SHIFT INTERRUPT BIT
D7B5: 09 1F     138  CLKWRITE ORA   #%00011111 ADD READ CODE/DATA CODE
D7B7: 8D A3 C0  139           STA   CLOCKRD    BLOCK OTHER INTERRUPTS
D7BA: 8D A2 C0  140           STA   CLOCKWR    SET CONTROL AND ADDRESS
D7BD: 60        141           RTS
                142  DRIVERND EQU   *

--End assembly, 153 bytes, Errors: 0
```


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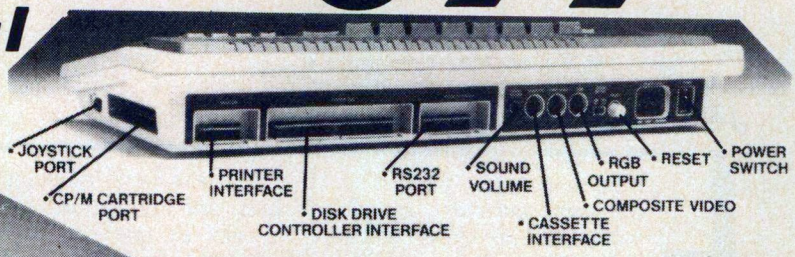

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RAM	**192K**	64K	128K
Runs Apple II Software	**Yes**	Yes	No
Function Keys	**24**	None	16
4 Voice, 6 Octave Sound	**Yes**	No	Yes
Composite Video	**Yes**	Yes	Yes
Disk Drive	**included**	Extra Cost	Extra Cost
Numeric Keypad	**included**	Extra Cost	Included
Video Cable	**included**	Extra Cost	Extra Cost
RGB Color Card	**included**	Extra Cost	Included
80 Column Card	**included**	Extra Cost	Included
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CIRCLE **47** READER SERVICE CARD

Issues in Using Spreadsheets: Part 3

Jeffrey M. Jacques

LAST month we examined six of the eight questions associated with using spreadsheet software and the advantages of building templates. We explored the following questions:

QUESTION # 1: Do I Understand The Problem?
QUESTION # 2: Template or Worksheet?
QUESTION # 3: How Can I Best Structure The Template?
QUESTION # 4: How Can I Best Communicate My Results?
QUESTION # 5: What Data Are Needed?
QUESTION # 6: What Is/Are The Essential Formulae?

In this article we shall explore the remaining basic questions and test our skills by examining a third common application — determining your net worth. But, before we do so, this is the time to explore questions 7 through 15.

QUESTION - 7: How Redundant Should a Template Be?

Redundant? This term is probably a little strong. But whenever you are working with a series of values, it's a good idea to build a variety of checks into your worksheet and template. This will help capture possible errors.

For example, if you are working with a column of numbers such that the numbers are divided into logical sections (e.g., a budget, and each section with its own subtotal), why not compare the sum of the subtotals with the sum of the individual values? Similarly, if you are working with a data entry table where the sum of the row totals should equal the sum of the column totals, why not compare the two summated values and make sure that each yields the same result? As I said, the term redundant may be an overstatement. Perhaps a better question is: How can I build into my template a series of logical checks so that any user can capture whatever errors there may be?

QUESTION - 8: What Have I Forgotten?

Once you complete your initial template, identifying how you shall structure data entry, formulae, and data output, then this is a good time to stop and take a deep breath. Actually, it's the best time to stop and ask yourself: What did I forget? What's missing? If nothing appears to be missing, then ask: Are all the data entry values used appropriately in the formulae? Do the formulae logically fit the data entered and the final tabular display? This is the time to stop, think a little more, then go on to build the template.

QUESTION - 9: What's The Easiest Way To Build The Template?

Once you have identified what you wish to do, for whom you are doing it, how you wish the user to enter the data, how you wish to compute and display the final values, then go ahead and set aside a block of uninterrupted time in a quiet environment. Nothing is more frustrating than getting half way through a template, being interrupted, and then losing track of where you were going.

To help recover from such interruptions, and to build templates effectively, I suggest the following. First, make sure that you have all the materials easily at hand and that you know what you want to do. Second, make sure that you have a copy of the documentation of your spreadsheet software with you. Spending an hour looking for how to enter a single function can produce enormous frustration, to say nothing of getting you off the track of your model. Finally, find that quiet spot and sufficient time where interruptions are unlikely to occur. Set aside enough time to complete each section of the model in its entirety before moving on to the next section.

QUESTION -10: How Best To Test This Version Of The Template?

As in any software you would create for yourself or some other user, make sure that you have set aside ample time to test all aspects of the model. Here are some useful questions to help you evaluate your initial template:

1. Are the purpose(s) of the model and its components clear?
2. Are the presentation of the data entry and finding clear? concise? and useful?
3. Are the results accurate?

If you can answer yes to the first two questions, then try the third. For complex models, try to find worked examples from a variety of resources. Then, enter test data into your template and check to see that you get the same results as those reported by a variety of other users of such formulae.

QUESTION -11: What Cells Need To Be Protected?

Once you are satisfied that your template does what it is supposed to do, then protect all cells which do not require data entry. This can easily be done with most spreadsheet software. Even using the standard VisiCalc program, you can enter the /Title command and place the marker in a cell beyond the protected area. If you are using THE Spreadsheet, then look at using the /ATTRIBUTE command. In our checkbook template, all the cells in label columns and the Balance column should be protected. Similarly, all the labels in our home budget and all cells with formulae should be protected, too. Such precautions will save you and other users considerable aggravation and prevent the erasure of important formulae from the model. This may not sound like a terrible problem. But, if you created the template from one of the previous articles, or if you created a template which uses complex formulae, then you may find yourself wasting several hours trying to recreate it. It's easier, better, and simpler to protect these cells and restrict the user to a few data entry cells.

QUESTION -12: Do I Need Instructions In This Template?

For large and complex models, it is often useful to include several instructions on what to do and where to find the results. If the template is very large with multiple sections, then you might wish to include a

table of contents, too. For these complex models, when the template is loaded, make sure that the table of contents is displayed immediately so that any users can easily find what they need. By carefully placing your marker before you save your template, most spreadsheet programs will then re-load the template so that this cell is in the upper left-hand corner of the display. (Try saving your template with the marker in different locations. You may be surprised to see what difference this can make for the typical user.)

Additionally, you may need to give ancillary instructions on how to enter the data. For example, we often use percents in many equations. Much of the time, however, we use proportions rather than percents. Labels next to these data entry cells may need to stipulate the additional instructions to enter proportions rather than percents.

QUESTION -13: Final Warnings—Recalculations?

A final additional instruction is the statement noting the need to re-calculate. Although one should try to reference cells in a logical columnar or row order, it is often impossible to have every tabulation for every cell in this strict order. (Our December Tax templates are a good example of this problem.) So, you may need to indicate to the user that he or she will need to have THE Spreadsheet recompute all the cell values. Without recalculations—when references in the template are out of order—the first calculation execution will not yield the correct results. When recomputations are necessary, then indicate so on the template. Perhaps the best place to indicate this is immediately under the data entry routine or the result display section.

QUESTION -14: Do I Need Other Documentation?

The need for additional documentation rests on the complexity of the template and the expected users. I believe that most documentation should be included in the template. But, if you expect unsophisticated users to be able to use your template with success, then, supplemental documentation may be helpful. Such documentation should include template:

1. name
2. author
3. date of last update
4. description of
   a. data needed
   b. formulae used (optional)
   c. outputs produced
5. directions for data entry
6. how to produce hard copies of the results; and
7. what to do in case of problems.

You might wish to include a copy of what the user will expect to find when he or she loads the template and what it should look like when the user has entered the data into the appropriate cells. Finally, you might even wish to include a place for the user to log his or her use of the program.

QUESTION -15: How Best To Test The Final Template?

If you are constructing the template for your own use, then little additional testing is necessary. If you are constructing the template for others, then set aside a couple of hours and find a quiet place. Then, run several testing/training sessions with the people who are likely to use it. Indicate that you are interested in testing the template, not the people. This will reduce their fears and help you evaluate your template. By now you are pretty sure that your model works correctly. But this is your chance to make sure that it does what you expect and that others can use it.

A WORKED EXAMPLE

Now, here's your chance to test what you have learned from the last three articles. Go ahead and build a template that you, or for that matter your friends and

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colleagues, can use to measure the net worth of most people. Spend some time thinking about it before you try it. Ask yourself the questions we have considered in the last few articles.

After creating your own template, compare what you have done with that listed in Tables 1 through 4. In following my own recommendations, I have studied the problem and chosen to divide the template into two parts. The first deals with personal possessions while the second deals more directly with net worth. To help any user find where he/she needs to be, I have included in this template a menu of options. As noted in the top part of the Table, the "personal possessions" elements begin in cell A10 and go through cell G119. The "net worth statement" begins in cell D120 and is completed in cell L193.

The personal possessions part of the template is divided into two major sections and a few minor ones. Across the top, the user will have an opportunity to enter his/her name and the date. Make sure that the current year is in cell D11. We shall be using it to help determine the current value of the possessions.

Note that in column A you will find a list of everything I could think of that might apply to me or you. Take a minute and examine Table 1. I think that you will find it quite comprehensive.

Calculating the value of any item requires one to consider not only the purchase price, but its useful life and value at the end of its useful life. In order to compute the present value of each item, the user must enter its cost or price in column B, the year that it was purchased in column C, the number of years of useful life remaining in column D, and its estimated resale value at the end of its useful life in column E. Four data entries must be made, therefore, for each personal possession item.

Once these data elements are entered, the template will use column F and compute the current value of each item based on either its resale value or its purchase price minus its depreciated value. Depreciation is computed on a straight line depreciation basis.

Let's examine the formula used in column F a little more closely. (Table 3). A good set of items to begin with are those things which cost the most. The single largest expenditure for most people is typically a home, we will begin there.

Most homes appreciate rather than depreciate over the normal course of one's life. Let's assume that your cost for a new home was $70,000 and it was purchased in 1979. Let's further assume that the current market value of your home, given inflation and the improvements you made to it over the past several years, is $100,000. Then, given the @IF statement in cell F18, THE Spreadsheet and our template would report the resale value of $100,000.00 rather than the purchase price minus depreciation. Let's look a little closer. Here's the formula.

@IF(B18ME18,
@IF(E18M((D18-(D11-C18)/D18)
***B18),E18,((D18-(D11-C18)**
D18*B18))) E18)

Since B18—$70,000—is not greater than E18—$100,000, enter the value stored in E18 into cell F18. (Note the arrows pointing to the elements in the @IF statement

TABLE 1

PERSONAL POSSESSIONS & HOME INVENTORY SECTION OF PERSONAL POSSESSION & NET WORTH TEMPLATE

	A	B	C	D	E	F	G
1	Jacques		Menu of Opti ons				
2	1/1/86						
3		Model	Begin. Cell	Ending Cell			
4							
5		Personal PO.	A10	G119			
6		Net Worth	D120	L197			
7		Annual Intr. & Expenses	D198	L226			
8							
9		Name:	John & Mary	Doe			
10		Date:	July 4,	1984			
11							
12		PERSONAL	POSSESSIONS	AND HOME INV	ENTORY		
13	Item	Cost & Price $	Year Purchased	Estimated Product Life	RESALE VALUE $	Current Value $	Subtotals $
14	Home:	70000.00	1979	40.00	100000.00	100000.00	100000.00
15	Automobiles:						
16	1st. Auto	3000.00	1981	5.00	500.00	1200.00	
17	2nd. Auto	2500.00	1975	15.00	2000.00	2000.00	
18	3rd. Auto					0.00	
19	Motorcycle	350.00	1978	10.00	50.00	140.00	
20	Other					0.00	
21	Subtotal	.....	.....	.....	.....	3340.00	3340.00
22	Computer:						
23	Apple	1200.00	1980	7.00	350.00	514.29	
24	Disk Drives	450.00	1980	7.00	100.00	192.86	
25	Monitor	155.00	1982	10.00	50.00	124.00	
26	Other Hard.	750.00	1981	6.00	50.00	375.00	
27	Software	1000.00	1980	7.00	100.00	428.57	
28	Other					0.00	
29	Subtotal	.....	.....	.....	.....	1634.71	1634.71
30	Household Appliances:					0.00	
31	Color TV	980.00	1980	10.00	75.00	588.00	
32	B&W TV	125.00	1975	10.00	25.00	25.00	
33	Stereo sys.	1200.00	1977	15.00	150.00	640.00	
34	Refrig.	700.00	1979	15.00	50.00	466.67	
35	Freezer	250.00	1982	15.00	50.00	216.67	
36	Washer/Dry.	560.00	1982	15.00	100.00	485.33	
37	Other					0.00	
38	Subtotal	.....	.....	.....	.....	2421.67	2421.67
39	Furniture:						
40	Living Rm.	1250.00	1978	15.00	200.00	750.00	
41	Dining Rm.	1100.00	1975	25.00	2000.00	2000.00	
42	Family Rm.	400.00	1979	10.00	50.00	200.00	
43	Bedrooms	2000.00	1979	15.00	250.00	1333.33	
44	Other					0.00	
45	Subtotal	.....	.....	.....	.....	4283.33	4283.33
46	Office:						
47	Furniture	400.00	1982	15.00	50.00	346.67	
48	Typewriter	350.00	1977	10.00	100.00	105.00	
49	Books	300.00	1980	3.00	25.00	25.00	
50	Other					0.00	
51	Subtotal	.....	.....	.....	.....	476.67	476.67
52	Tableware:						
53	China	500.00	1975	25.00	1200.00	1200.00	
54	Crystal	400.00	1975	25.00	1000.00	1000.00	
55	Flatware	800.00	1975	25.00	12500.00	12500.00	
56	Subtotal	.....	.....	.....	.....	14700.00	14700.00
57	Jewelry & Fu rs:						
58	His Jewelry	300.00	1980	25.00	250.00	252.00	
59	Her Jewelry	4500.00	1975	25.00	5500.00	5500.00	
60	Children's	400.00	1977	25.00	450.00	450.00	
61	Furs	800.00	1980	10.00	100.00	480.00	
62	Other					0.00	
63	Subtotal	.....	.....	.....	.....	6682.00	6682.00
64	Antiques:						
65	Paintings	890.00	1975	25.00	1000.00	1000.00	
66	Clocks					0.00	
67	Other					0.00	
68	Subtotal	.....	.....	.....	.....	1000.00	1000.00
69	Hobbies:						
70	Stamps					0.00	
71	Coins					0.00	
72	Camera	450.00	1978	10.00	50.00	180.00	
73	Dark Rm. Eq					0.00	
74	Other					0.00	
75	Subtotal	.....	.....	.....	.....	180.00	180.00
76	Miscel.						
77	Power Tools	300.00	1979	7.00	50.00	85.71	
78	Hand Tools	150.00	1979	15.00	50.00	100.00	
79	Sports Equp					0.00	
80	Garden Equp	250.00	1979	10.00	25.00	125.00	
81	Subtotal	.....	.....	.....	.....	310.71	310.71
82	TOTAL					135029.10	135029.10

where the decision and values are identified.) This makes logical sense since you would not want to depreciate a home which has in fact, appreciated over the past years.

Let's take a second example. The purchase of a car is the second most significant purchase for most people. Let's assume that you purchased a used car

TABLE 2

TABLE 3.2. FINANCIAL STATEMENT AND ESTIMATED INCOME/EXPENSES PART OF PERSONAL POSSESSIONS AND NET WORTH TEMPLATE

	D	E	F	G	H	I	J	K	L
120									
121	PERSONAL	FINANCIAL			FOR:	John & Mary	Doe	As Of:	12/15/86
122	NET WORTH	STATEMENT							
123									
124									
125		A S S E T S					L I A B I L I T I E S		
126									
127			$$$$$$$$$$$$	Subtotals				$$$$$$$$$$$$	Subtotal
128									
129	Current Bank	Assets:				Current Majo	r Liabil:		
130	Cash		500.00			Notes Due	Banks		
131	Checking		750.00			Notes Due	Relatives	1000.00	
132	Savings:	Passbook	389.00			Notes Due	Others		
133	Savings:	Credit Union	2200.00			MasterCard		350.00	
134	Savings:	Money Market	10000.00			Visa			
135	Other					Overdraw on	Checking		
136						Other			
137									
138	Subtotal	.....	13839.00	13839.00		Subtotal	.....	1350.00	1350.00
139									
140									
141									
142						Accounts & B	ills Payable		
143	Current Cash	Value of:				Dentist		250.00	
144	Annuities					Accountant		100.00	
145	Certificate	s of Deposit				Department	Store	250.00	
146	Permanent	Life Insuran							
147	Retirement								
148	U.S. Saving	s Bonds	325.00						
149	Other		300.00						
150									
151	Subtotal	.....	625.00	625.00		Subtotal	.....	600.00	600.00
152									
153	Current Mark	et Value:				Taxes to Be	Paid:		
154	Bonds					(not withhel	d)		
155	Investments		3000.00			Federal Inc	ome Taxes	230.00	
156	Mutual Fund					State and C	ity Taxes		
157	Options					Personal Pr	operty Taxes	998.00	
158	Stocks		1200.00			Assessment			
159	Other					Self Employ	ment		
160						Other Taxes			
161									
162	Subtotal	.....	4200.00	4200.00		Subtotal	.....	1228.00	1228.00
163									
164									
165						Loans to be	Paid:		
166						Mortgage	(home)	55000.00	
167	Current Mark	et Value of:				Mortgage	(other prop)		
168	Other Real	Estate	ENTER #			Liens & Ass	essments		
169	Home		100000.00			Rent Owed			
170	Autos		3340.00			Life Insura	nce loans		
171	Computer Eq	uipment	1634.71			Installment	loans:		
172	Household G	oods	2421.67				Appliances		
173	Furniture		4283.33				Auto-1st.		
174	Office equi	pment	476.67				Auto-2nd.	1000.00	
175	Tableware		14700.00				Computer		
176	Furs, Jewel	ery	6682.00				Education		
177	Antiques		1000.00				Furniture		
178	Hobbies/Inv	estments	180.00				Home improve	2000.00	
179	Misc.		310.71				Jewelry		
180	Other						Others		
181						Other			
182	Subtotal	.....	135029.10	135029.10		Subtotal	.....	58000.00	58000.00
183									
184									
185	Other Assets	:				Other Outsta	nding Debts:		
186	Business	Interests				Stocks Boug	ht on Margin		
187	Money Owed	to you							
188	Mortgages	you own	7500.00			Other			
189	Tax Refunds	due				Subtotal	.....	0.00	0.00
190	Other								
191	Subtotal	.....	7500.00	7500.00					
192									
193	TOTAL CURREN	T ASSETS $		161193.10		TOTAL CUR	RENT LIABILI	TIES $	61178.00
194									
195									
196							NET WORTH	$	100015.10
197	**********	**********	**********	**********	**********	**********	**********	**********	**********
198									
199		A N N U A L	I N C O M E			A N N U A L	E S T I M	A T E D E X	P E N S E S
200									
201			$$$$$$$$$$$$	Subtotal				$$$$$$$$$$$$	Subtotal
202									
203	Salary & Com	missions	35000.00			Taxes:			
204	Bonuses		2000.00			Income		7500.00	
205						Property		1200.00	
206	Dividends &	Interest	3200.00			Other			
207									
208	Rental & Lea	ses (net)				Subtotal	.....	8700.00	8700.00
209									
210	Other		1920.00						
211									
212						Yearly Expen	ses:		
213	TOTAL INCOME		42120.00	42120.00		Mortgage Pa	yments	6360.00	
214						Rent Paymen	ts		
215						Church Memb	ership	400.00	
216						Insurance:			
217							Auto	200.00	
218							Health	534.00	
219							Life	423.00	
220						Utilities		2500.00	
221						Other			
222									
223						Subtotal	.....	10417.00	10417.00
224									
225	**********	**********	**********	**********	**********	TOTAL ESTIMAT	ED EXPENSES		19117.00
226	**********	**********	**********	**********	**********	**********	**********	**********	**********

from your friendly AAA Used Car Shop at a cost of $3,000. It was purchased in 1981 and has another five years of use, at the end of which it will be worth about $500. Its current value is determined with the following:

```
@IF(B21ME21,
@IF(E21M((D21-(D11-C21)/D21)
*B21),E21,
((D21M(D11MC21)/D21*B21))), E21)
```

Okay, the purchase price of $3,000 in cell B21 is greater than the resale value of $500. So, following this formula, do the @IF statement in the second part of the expression. That is, determine if the resale value (cell E21) is greater than the estimated value after depreciation ((D21-(D11-C21)/D21*B21). (Compute the estimated value after depreciation by determining the proportion of the total life expectancy of the product (D21-(D11C21)/D21) "used up," and then multiply this value by its cost or price.)

Now, returning to our problem, we wish to report the current value (original price less depreciation) when this value is greater than the resale value. It is reported in cell F21—a value of $1200.

When we encounter the situation where the resale value is less than the original cost but higher than the amount one would expect given depreciation, then report the resale amount in the current value column—column F. Let's assume that you purchased an early version of the VW bug for $2,500. Let's assume further that you do not plan to use it very much and that you plan to do some work on it. Therefore, you do not expect it to depreciate very much—its resale value

TABLE 3 PERSONAL POSSESSIONS & HOME INVENTORY SECTION OF PEROSNAL POSSESSION & NET WORTH TEMPLATE:FORMULAE

	A	B	C	D	E	F	G
1	Jacques		Menu of Opti ons				
2	1/1/86						
3		Model	Begin. Cell	Ending Cell			
4							
5		Personal PO.	A10	G119			
6		Net Worth	D120	L197			
7		Annual Intr.					
8		& Expenses	D198	,L226			
9							
10		Name:	John & Mary	Doe			
11		Date:	July 4,	1984			
12							
13		PERSONAL	POSSESSIONS	AND HOME INV	ENTORY		
14							
15	Item	Cost & Price $	Year Purchased	Estimated Product Life	RESALE VALUE $	Current Value $	Subtotals $
16							
17							+F18
18	Home:					@IF(B18>E18,@IF(E18> ((D18-(D11-C18)/D18)*B18), E18,((D18-(D11-C18)/D18*B18))),E18)	
19							
20	Automobiles:						
21	1st. Auto					@IF(B21>E21,@IF(E21> ((D21-(D11-C21)/D21)*B21),E21, ((D21-(D11-C21)/D21*B21))),E21)	
22	2nd. Auto					@IF(B22>E22,@IF(E22> ((D22-(D11-C22)/D22)*B22),E22, ((D22-(D11-C22)/D22*B22))),E22)	
23	3rd. Auto					@IF(B23>E23,@IF(E23> ((D23-(D11-C23)/D23)*B23),E23, ((D23-(D11-C23)/D23*B23))),E23)	
24	Motorcycle					@IF(B24>E24,@IF(E24> ((D24-(D11-C24)/D24)*B24),E24, ((D24-(D11-C24)/D24*B24))),E24)	
25	Other					@IF(B25>E25,@IF(E25> ((D25-(D11-C25)/D25)*B25),E25, ((D25-(D11-C25)/D25*B25))),E25)	
26							
27	Subtotal	.....	.....	.....	.....	+F20+F21+F22+F23+F24+F25+F26	@SUM(F20...F26)
28							
29							
30	Computer:						
31	Apple					@IF(B31>E31,@IF(E31> ((D31-(D11-C31)/D31)*B31),E31, ((D31-(D11-C31)/D31*B31))),E31)	
32	Disk Drives					@IF(B32>E32,@IF(E32> ((D32-(D11-C32)/D32)*B32),E32, ((D32-(D11-C32)/D32*B32))),E32)	
33	Monitor					@IF(B33>E33,@IF(E33> ((D33-(D11-C33)/D33)*B33),E33, ((D33-(D11-C33)/D33*B33))),E33)	
34	Other Hard.	750.00	1981	6.00	50.00	@IF(B34>E34,@IF(E34> ((D34-(D11-C34)/D34)*B34),E34, ((D34-(D11-C34)/D34*B34))),E34)	
35	Software	1000.00	1980	7.00	100.00	@IF(B35>E35,@IF(E35> ((D35-(D11-C35)/D35)*B35),E35, ((D35-(D11-C35)/D35*B35))),E35)	
36	Other					@IF(B36>E36,@IF(E36> ((D36-(D11-C36)/D36)*B36),E36, ((D36-(D11-C36)/D36*B36))),E36)	
37							
38	Subtotal	.....	.....	.....	.....	+F30+F31+F32+F33 +F34+F35+F36+F37	@SUM(F30...F37)
39							
40							
41	Household						
42	Appliances:						
43	Color TV					@IF(B43>E43,@IF(E43> ((D43-(D11-C43)/D43)*B43),E43, ((D43-(D11-C43)/D43*B43))),E43)	
44	B&W TV					@IF(B44>E44,@IF(E44> ((D44-(D11-C44)/D44)*B44),E44, ((D44-(D11-C44)/D44*B44))),E44)	
45	Stereo sys.					@IF(B45>E45,@IF(E45> ((D45-(D11-C45)/D45)*B45),E45, ((D45-(D11-C45)/D45*B45))),E45)	
46	Refrig.					@IF(B46>E46,@IF(E46> ((D46-(D11-C46)/D46)*B46),E46, ((D46-(D11-C46)/D46*B46))),E46)	
47	Freezer					@IF(B47>E47,@IF(E47> ((D47-(D11-C47)/D47)*B47),E47, ((D47-(D11-C47)/D47*B47))),E47)	
48	Washer/Dry.					@IF(B48>E48,@IF(E48> ((D48-(D11-C48)/D48)*B48),E48, ((D48-(D11-C48)/D48*B48))),E48)	
49	Other					@IF(B49>E49,@IF(E49> ((D49-(D11-C49)/D49)*B49),E49, ((D49-(D11-C49)/D49*B49))),E49)	
50							
51	Subtotal	.....	.....	.....	.....	+F41+F42+F43+F44+F45 +F46+F47+F48+F49+F50	@SUM(F41...F50)
52							
53							
54	Furniture:						
55	Living Rm.					@IF(B55>E55,@IF(E55> ((D55-(D11-C55)/D55)*B55),E55, ((D55-(D11-C55)/D55*B55))),E55)	

```
 56  Dining Rm.
                                                  @IF(B56>E56,@IF(E56>
                                                ((D56-(D11-C56)/D56)*B56),E56,
 57  Family Rm.                                   ((D56-(D11-C56)/D56*B56))),E56)
                                                  @IF(B57>E57,@IF(E57>
                                                ((D57-(D11-C57)/D57)*B57),E57,
 58  Bedrooms                                     ((D57-(D11-C57)/D57*B57))),E57)
                                                  @IF(B58>E58,@IF(E58>
                                                ((D58-(D11-C58)/D58)*B58),E58,
 59  Other                                        ((D58-(D11-C58)/D58*B58))),E58)
                                                  @IF(B59>E59,@IF(E59>
                                                ((D59-(D11-C59)/D59)*B59),E59,
 60                                             ((D59-(D11-C59)/D59*B59))),E59)
 61  Subtotal ..... ..... ..... .....             +F54+F55+F56                    @SUM(F54...F60)
 62                                                +F57+F58+F59+F60
 63
 64 Office:
 65  Furniture
                                                  @IF(B65>E65,@IF(E65>
                                                ((D65-(D11-C65)/D65)*B65),E65,
 66  Typewriter                                   ((D65-(D11-C65)/D65*B65))),E65)
                                                  @IF(B66>E66,@IF(E66>
                                                ((D66-(D11-C66)/D66)*B66),E66,
 67  Books                                        ((D66-(D11-C66)/D66*B66))),E66)
                                                  @IF(B67>E67,@IF(E67>
                                                ((D67-(D11-C67)/D67)*B67),E67,
 68  Other                                        ((D67-(D11-C67)/D67*B67))),E67)
                                                  @IF(B68>E68,@IF(E68>
                                                ((D68-(D11-C68)/D68)*B68),E68,
 69                                             ((D68-(D11-C68)/D68*B68))),E68)
 70  Subtotal ..... ..... ..... .....             +F64+F65+F66                    @SUM(F64...F69)
 71                                                +F67+F68+F69
 72
 73 Tableware:
 74  China
                                                  @IF(B74>E74,@IF(E74>
                                                ((D74-(D11-C74)/D74)*B74),E74,
 75  Crystal                                      ((D74-(D11-C74)/D74*B74))),E74)
                                                  @IF(B75>E75,@IF(E75>
                                                ((D75-(D11-C75)/D75)*B75),E75,
 76  Flatware                                     ((D75-(D11-C75)/D75*B75))),E75)
                                                  @IF(B76>E76,@IF(E76>
                                                ((D76-(D11-C76)/D76)*B76),E76,
 77                                             ((D76-(D11-C76)/D76*B76))),E76)
 78  Subtotal ..... ..... ..... .....               +F73+F74+F75                  @SUM(F73...F77)
 79                                                  +F76+F77
 80
 81 Jewelry & Fu rs:
 82  His Jewelry
                                                  @IF(B82>E82,@IF(E82>
                                                ((D82-(D11-C82)/D82)*B82),E82,
 83  Her Jewelry                                  ((D82-(D11-C82)/D82*B82))),E82)
                                                  @IF(B83>E83,@IF(E83>
                                                ((D83-(D11-C83)/D83)*B83),E83,
 84  Children's                                   ((D83-(D11-C83)/D83*B83))),E83)
                                                  @IF(B84>E84,@IF(E84>
                                                ((D84-(D11-C84)/D84)*B84),E84,
 85  Furs                                         ((D84-(D11-C84)/D84*B84))),E84)
                                                  @IF(B85>E85,@IF(E85>
                                                ((D85-(D11-C85)/D85)*B85),E85,
 86  Other                                        ((D85-(D11-C85)/D85*B85))),E85)
                                                  @IF(B86>E86,@IF(E86>
                                                ((D86-(D11-C86)/D86)*B86),E86,
 87                                             ((D86-(D11-C86)/D86*B86))),E86)
 88  Subtotal ..... ..... ..... ..... >F88:+F81+F82+F83+F84+F85+F86+F87          @SUM(F81...F87)
 89
 90
 91 Antiques:
 92  Paintings
                                                  @IF(B92>E92,@IF(E92>
                                                ((D92-(D11-C92)/D92)*B92),E92,
 93  Clocks                                       ((D92-(D11-C92)/D92*B92))),E92)
                                                  @IF(B93>E93,@IF(E93>
                                                ((D93-(D11-C93)/D93)*B93),E93,
 94  Other                                        ((D93-(D11-C93)/D93*B93))),E93)
                                                  @IF(B94>E94,@IF(E94>
                                                ((D94-(D11-C94)/D94)*B94),E94,
 95                                             ((D94-(D11-C94)/D94*B94))),E94)
 96  Subtotal ..... ..... ..... .....               +F91+F92+F93+F94+F95          @SUM(F91...F95)
 97
 98
 99 Hobbies:
100  Stamps
                                                  @IF(B100>E100,@IF(E100>
                                                ((D100-(D11-C100)/D100)*B100),E100,
101  Coins                                        ((D100-(D11-C100)/D100*B100))),E100)
                                                  @IF(B101>E101,@IF(E101>
                                                ((D101-(D11-C101)/D101)*B101),E101,
102  Camera                                       ((D101-(D11-C101)/D101*B101))),E101)
                                                  @IF(B102>E102,@IF(E102>
                                                ((D102-(D11-C102)/D102)*B102),E102,
103  Dark Rm. Eq                                  ((D102-(D11-C102)/D102*B102))),E102)
                                                  @IF(B103>E103,@IF(E103>
                                                ((D103-(D11-C103)/D103)*B103),E103,
104  Other                                        ((D103-(D11-C103)/D103*B103))),E103)
                                                  @IF(B104>E104,@IF(E104>
                                                ((D104-(D11-C104)/D104)*B104),E104,
105                                            ((D104-(D11-C104)/D104*B104))),E104)
106  Subtotal ..... ..... ..... .....            +F99+F100+F101+F102+F103+F104    @SUM(F99...F104)
107
108
109 Miscel.
110  Power Tools
                                                  @IF(B110>E110,@IF(E110>
                                                ((D110-(D11-C110)/D110)*B110),E110,
111  Hand Tools                                   ((D110-(D11-C110)/D110*B110))),E110)
                                                  @IF(B111>E111,@IF(E111>
                                                ((D111-(D11-C111)/D111)*B111),E111,
112  Sports Equp                                  ((D111-(D11-C111)/D111*B111))),E111)
                                                  @IF(B112>E112,@IF(E112>
                                                ((D112-(D11-C112)/D112)*B112),E112,
113  Garden Equp                                  ((D112-(D11-C112)/D112*B112))),E112)
                                                  @IF(B113>E113,@IF(E113>
                                                ((D113-(D11-C113)/D113)*B113),E113,
114                                            ((D113-(D11-C113)/D113*B113))),E113)
115  Subtotal ..... ..... ..... .....            +F109+F110+F111+F112+F113        @SUM(F109...F113)
116
117
118 TOTAL
                                                    +F18+F27+F38+F51+F61          @IF(@SUM(G18...G116)=F118,
                                                  +F70+F78+F88+F96+F106+F115       (@SUM(G18...G116),@ERROR)
```

SPREADSHEET continued on pg. 39

Review of "Kyan Pascal"

Michael Fink

Product:	Kyan Pascal, v. 2.0
Use:	Programming Language
For:	Apple II + (64K), *II*e, *II*c
Company:	Kyan Software 1850 Union Street, Suite 183 San Francisco, CA 94123
Price:	$69.95 (plus $4.50 shipping/handling) $99.95, with KIX

UNTIL recently Apple II users interested in Pascal programming have had few choice between versions of the language. Well-known Apple Pascal is an implementation of UCSD Pascal. UCSD "p-code" compiles quickly, but runs only moderately fast, since it is interpreted. However, numerous extensions to the original standard make it attractive. The much faster Turbo Pascal is also available for the Apple II family, but it requires CP/M and a Z-80 card.

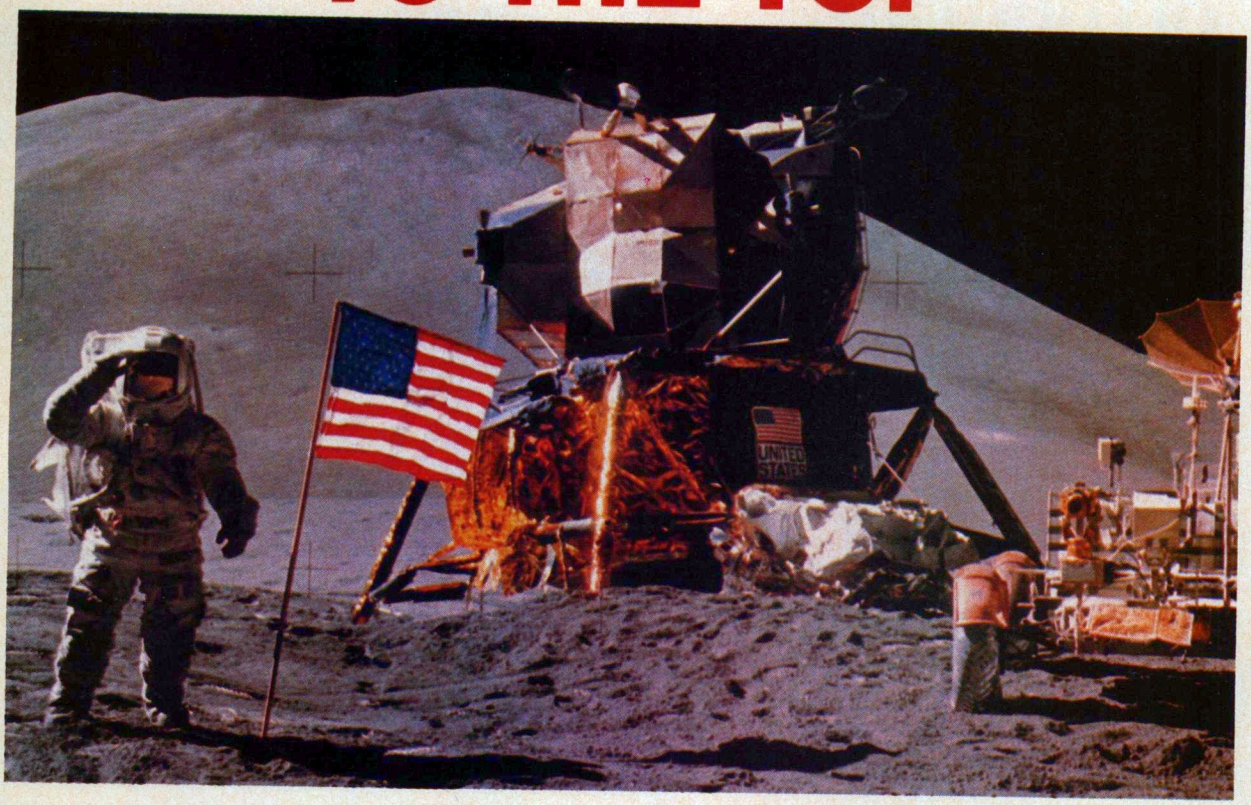
Kyan, a "Standard" Pascal

With the publication of Kyan Pascal last year, "Standard" Pascal was introduced to the Apple world. Standard Pascal is purposely machine-independent and therefore quite portable. Some Standard Pascal compilers can be slow, but the resulting object code runs quite fast, because it is"native" Machine Language. This normally runs under the computer's own operating system, in this case, ProDOS. The major disadvantage of any Standard Pascal is its lack of extensions, particularly in the area of I/O. Enhancements as simple as Applesoft's HOME command are completely missing. These must be supplied as runtime library extensions or as separate, pre-defined, linkable/mergeable library procedures. Kyan Pascal, version 2.0, is a full implementation of the Jensen & Wirth standard and conforms to the ISO Standard for Pascal Compilers. The diskette contains several useful predefined library functions and procedures which can be linked to a program at compile time. These include CHAIN; HIRES; PR(slot); LENGTH (string); CONCAT (string1, string2, string3); and INDEX (string1, string2) SUBSTRING (string, begin position, length). The inclusion of HIRES in a program enables "HGR" and "TX," two non-standard procedures. There are also a few non-standard procedures built into Kyan Pascal, such as "Seek (file, record)" used to address random access files.

Pascal Plus Assembly Language

One unique and valuable feature of Kyan Pascal is the inclusion of a macro assembler. Normally, a high level language such as Standard Pascal tries to insulate the programmer from machine-level concerns. The inclusion of an assembler bridges the gap between powerful, structured programming and the machine-level control that knowledgeable programmers can use to good advantage. Kyan's assembler allows "in-line" Assembly Language segments, as either discreet procedures or mixed with Pascal source code. Stand-alone Assembly Language programs can also be created with the assembler. What is more, in Pascal programs, parameters can actually be passed between Pascal and an Assembly Language procedure by indexing the "variables stack" pointer. Listing 1 shows two short procedures illustrating the use of Assembly Language. PROCEDURE Home simply utilizes the Apple monitor routine at -936 ($FC58) to clear the screen. PROCEDURE XYtab (originally from the Kyan newsletter – see below) places the cursor on the screen at column X and row Y, using values passed to the procedure as Pascal variables of type integer. These are retrieved from addresses in the variables stack, found by indexing the stack pointer, (a pre-defined label). Other routines can pass values back to Pascal by storing them in similar stack locations.

THE AMERICAN WAY TO THE TOP



This July 4th, we at Applied Engineering hope that all Americans will take time out to ponder who and what we are.

It is hoped that we can remind ourselves what it means to be an American.

We invented the telephone, the electric light, the phonograph, and the airplane. Americans invented the first vacuum tube, transistor and the integrated circuit, without which the personal computer would have been impossible. Over 95% of the world's new inventions are invented by Americans. We lead the world in all phases of technology; electronics, physics, chemistry, health science, space and robotics. We've sent men to the moon, landed a robot on Mars, and sent our probes out across the galaxy! Americans by their very nature are inventors, thinkers, winners and doers.

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To quote Dr. Robert Goddard in a letter to H. G. Wells, "There can be no thought of finishing, for 'aiming at the stars,' both literally and figuratively, is a problem to occupy generations, so that no matter how much progress one makes, there is always the thrill of just beginning."

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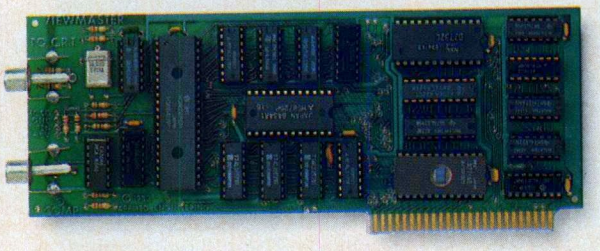

	BUILT-IN SOFTSWITCH	SHIFT KEY SUPPORT	LOW POWER DESIGN	80 COLUMN HOME	7 × 9 DOT MATRIX	LIGHT PEN INPUTS	40 COLUMN OVERRIDE	INVERSE CHARACTERS	
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SUPRTERM		√					√	√	
WIZARD 80					√		√	√	
VISION 80	√	√			√				
OMNIVISION		√					√	√	
VIEWMAX 80	√	√			√			√	
SMARTERM	√	√				√	√		
VIDEOTERM		√	√		√	√		√	

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(214) 241-6060

CIRCLE 4 READER SERVICE CARD

LISTING 1

```
(************************************)

PROCEDURE Home;
    BEGIN
#a
     JSR $FC58
#
    END; {Home}

(************************************)

PROCEDURE XYtab (x,y : integer);
    BEGIN
#a
    LDY #5
    LDA (_SP),Y
    TAY
    DEY
    STY $25
    LDY #7
    LDA (_SP),Y
    TAY
    DEY
    STY $24
    JSR $FC22
#
    END; {XYtab}

(************************************)
```

Configuration

Kyan Pascal is supplied on a double-sided diskette which is used in configuring a working copy specifically for the programmer's system. Storage options include one-or two-drive system, a Unidisk 3.5, and a hard disk. Kyan also supports all versions of the Apple II with at least 64K of memory and either 40 or 80 column display. I performed most of the testing for this review on a 64K Apple II+ with a Viewmaster 80 column card in slot 3, and several incompatibility problems resulted. The cursor performed erratically; screens in the editor and elsewhere would not erase entirely; and, worst of all, compiled object files hanged at the end instead of returning to the system command line. All these problems disappeared when the software was re-configured for 40 column operation. Tests on an Apple *IIe* with 80-column card (extended) worked just fine.

The Editor

Pascal Programs are first created as ASCII textfiles, which may be done on nearly any word processor or by using the Kyan Pascal editor. This is a full-screen editor with a variety of cursor controls modeled on Wordstar. There is also a tab command (80-column editors only) and a cut-and-paste feature which allows the programmer to save the cut buffer as a separate textfile. A "special command" menu supplies several further editing enhancements, including the insertion of a file from disk at the cursor. Listing 2 is an example of a program created with the Kyan Pascal editor. The program simply accesses a Pascal program file from disk and sends it to the printer using the name of the program and page number as a heading for each page. The statement "#I PR.I" at the end of the declaration section indicates a disk-based

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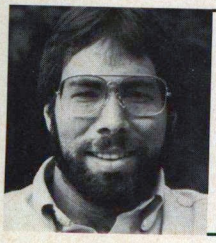

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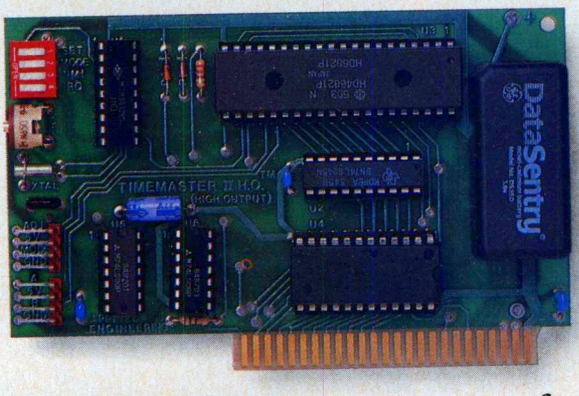

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procedure which is to be linked ('included') at compile time. PROCEDURE ToF merely sends a top-of-form character to the printer at the end of each page, and PROCEDURE Header prints the page heading. The compiled version of this program was used to print the listing.

The Compiler

The Kyan Pascal compiler/assembler produces a machine language program from a textfile written in Pascal in what appears to be three major steps. First, Pascal syntax and other rules are checked to make sure the program will actually compile. When errors are detected, messages are emitted and compilation ceases.

LISTING 2

```
PROGRAM PrintHeader;
{Reads a program textfile from disk and prints
a listing.Separates pages and prints headings.}

CONST

    lines = 54;

VAR

    f : TEXT;
    s : ARRAY [1..64] OF CHAR;
    pgcount, lncount : INTEGER;

#I PR.I

(*******************************)

PROCEDURE ToF;
    BEGIN
#A
    LDA #$0C
    JSR $FDED
#
    END;

(*******************************)

PROCEDURE Header (VAR lncount, pgcount: INTEGER);

    VAR c : INTEGER;

    BEGIN
    c := 0;

    REPEAT
    c := c + 1;
    Write (s[c]);
    UNTIL (s[c] = ' ')OR (c = 64);

    Writeln (' page ',pgcount);
    Writeln; Writeln;
    pgcount := pgcount + 1;
    lncount := 3
    END;

(*******************************)

BEGIN    {PrintHeader}
pgcount := 1;
lncount := 0;
```

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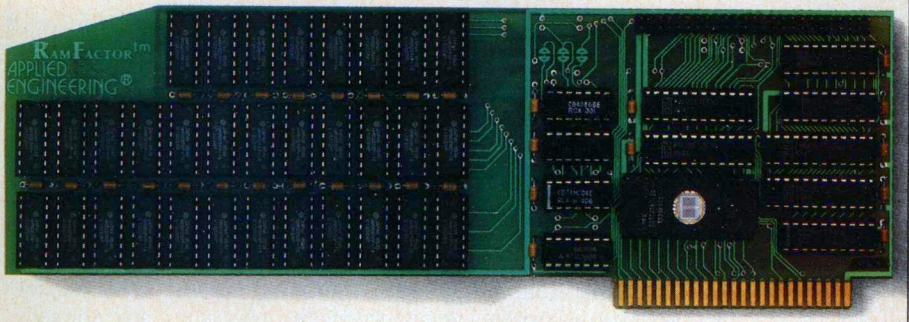

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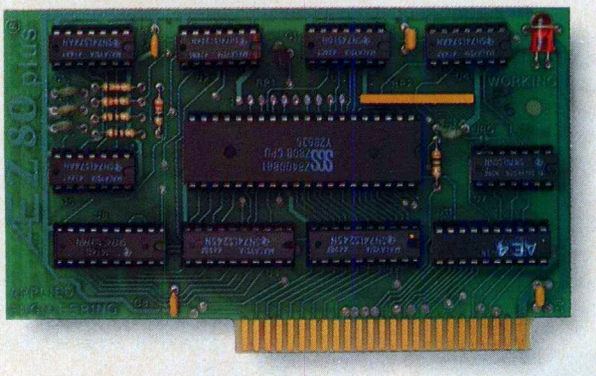

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```
Write ('PATHNAME: ');
Readln (s);
Reset (f,s);
PR(1);                {Printer Slot}
Header (lncount, pgcount);

WHILE NOT Eof (f) DO
    BEGIN
    IF lncount <= lines
    THEN
        BEGIN
        IF Eoln (f)
        THEN
            BEGIN
            Writeln;
            lncount := lncount + 1
            END
        ELSE Write (f^);
        GET (f)
        END
    ELSE
        BEGIN
        ToF;
        Header (lncount, pgcount)
        END
    END;

ToF;
PR(0)                 {Screen}
END.
```

Each message displays the offending line and shows the point(s) at which the error(s) occurred. As soon as the program can pass the first step, the compiler goes on to create an Assembly Language source file from the program. If desired, the source file may be saved to disk without going further. However, you would normally allow the compiler to automatically call in the assembler for the final step of assembling the source code into an object file in Machine Language and saving it to disk. This file, together with the runtime library file (LIB), is the running version of the program. A number of options are available during compilation. An alternate pathname may be given for the compiled file. Error messages may be directed to a printer or other device in any slot. The compiler can be commanded to reveal potential runtime errors. One amusing option informs the programmer about the compiler/assembler's progress as the source and object codes are created. The single criticism I have concerning the compiler/assembler is that it operates somewhat slowly. For example, on a two-drive system the brief program shown in Listing 2 required 36 seconds to compile and assemble into final Machine Language form.

KIX

Bundled with Kyan Pascal, v.2, comes a programming/operating environment called "KIX." As the publisher explains, KIX is an enhancement to ProDOS which is intended to replace the Filer and lend the operating system some of the features of Unix (and, implicitly, MS-DOS). When you boot the Kyan Pascal language disk, you are greeted with a menu and the KIX prompt (%). This indicates that the KIX operating shell is in place. The main body of KIX, however, is a set of 26 commands which activate disk-based routines. These range from simple directory listings to volume formatting, file copying, file comparison, directory creation/deletion, and screen dumps. If you remove the copy of ProDOS's Filer from the main Pascal diskette, there is room for several of your favorite KIX routines, which can then be called from the command line. As a sample, the following

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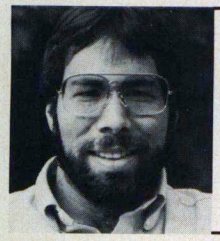

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is a group of most-used routines which the publisher recommends having handy:

CAT [Concatenate] Prints ASCII and other files with options for numbering lines, removing blank lines, and printing control characters.
CD [Change Directory] Re-designates system prefix.
CFG [Configure KIX System] Allows user to reconfigure system shell. Options include use of a RAMdisk, enabling an 80-column card, and printer defaults.
CP [Copy] Copies a file from one directory to another.
LPR [Line Print] Sends designated ASCII file to the printer with parameters for formatting and special printer codes.
LS [List: directories or files] Prints directory with such options as protection status, alphabetical sort, file type, file length, and directory length.
PWD [Print Working Directory] Prints current system prefix.
RM [Remove] Deletes files and directories.
SD [Screen Dump] Outputs current screen display to the printer.

The remainder of the KIX routines can be accessed with a little diskette swapping. However, if your computer has at least 128K of memory, the real power of KIX kicks in. When you then boot from a copy of the KIX diskette (supplied with the Kyan Pascal package), all the KIX routines will be loaded into auxiliary memory as a RAMdisk. Commands are then executed instantly. The KIX system appears to have been well tested. Even with the numerous keyboard errors I made while learning to use KIX properly, I could not make the system hang or crash. (I cannot claim the same with other ProDOS-based software). Error messages and on-screen directions were clear, the KIX prompt always reappeared faithfully, and hitting RESET simply caused the Apple to re-boot. There are two caveats I would offer the new KIX user. First, if you have a 2-drive system, perform a CD to your volume of Pascal program files ('/USER') after booting, since the editor, compiler, and all KIX commands will work anyway, and the compiler expects to find the Pascal textfile in the current working directory. Second, be sure to include a space between any KIX command and a following parameter, and before any additional parameters you might use. This should be illustrated better in the manual.

The one big criticism I have regarding KIX is that there is apparently no way to jump back to the beginning of a program which has been run and exited (e.g., the editor, the compiler, or your own program). The user must always be reloading from disk or RAMdisk. However, if you have enough memory for the latter, booting your system with a copy of the Kyan Pascal diskette will cause the editor, the assembler, and possibly a large number of KIX routines to be loaded into auxiliary memory. All such files can be accessed by main memory instantly. (It would seem that with a RAMdisk and a bit of file copying, you could create a fast, powerful, customized programming/operating system that would put everything in place on booting.) KIX appears to be an important contribution to the field of Apple II programming/operating environments. Its numerous useful routines are true enrichments of ProDOS's narrow repertoire. But KIX is very, very new – too new to assess the full impact that it may ultimately make on Apple computing.

Documentation and Publisher Support

In addition to a Pascal/KIX quick reference card, a sumptuous user's manual accompanies Kyan Pascal. Of its 431 pages, 168 are devoted to a general tutorial on the Pascal programming language. This chapter is more of a refresher course than a beginner's text, and I question its inclusion here. Perhaps it should be made available on request rather than placed in the center of a detailed software document. The manual's remaining 263 pages clearly and thoroughly describe the operation of Kyan Pascal and the KIX environment. The "Getting Started" chapter discusses ProDOS and its utilities, as well as how to configure the Kyan software to your own system. There are chapters on the editor, the assembler, KIX, and the non-standard extensions of Kyan Pascal (I/O, strings, graphics, random numbers, etc.).

One tremendously useful feature in the manual is a 97-page reference guide to the reserved words, pre-defined functions and procedures, and linkable routines used in Kyan Pascal. This section is concise and well-written. However, I could not find "Seek" in this guide. The publisher should double check for completeness before the next printing. Appendices provide technical specifications and a compendium of possible error messages. Additional procedures and useful information are made available to Kyan Pascal users through a bi-monthly subscription newsletter, *Update ---Kyan!*. This publication was begun last year to support version 1.x, and each issue has been jammed with goodies from the publisher and from users. Newly-discovered bugs are discussed, and help with these and other user problems is generously offered. The newsletter is an open forum and a continuing dialogue between users and publisher. No purchaser of Kyan Pascal will want to be without a subscription.

Recommendation

The more I use Kyan Pascal and KIX, the more enthusiastic I become. This is the first Pascal which uses the ProDOS operating system, and that should make learning the language and the environment easier than Apple Pascal. Moreover, Kyan Pascal appears to be a package one could grow with. The power of Pascal is such that a good implementation of it such as this can be used even for advanced software development. Kyan appears to be the only Standard Pascal on the market for the Apple, and it is both refreshing and exciting to work with such a powerful structured language running under an enhanced, extended form of ProDOS.

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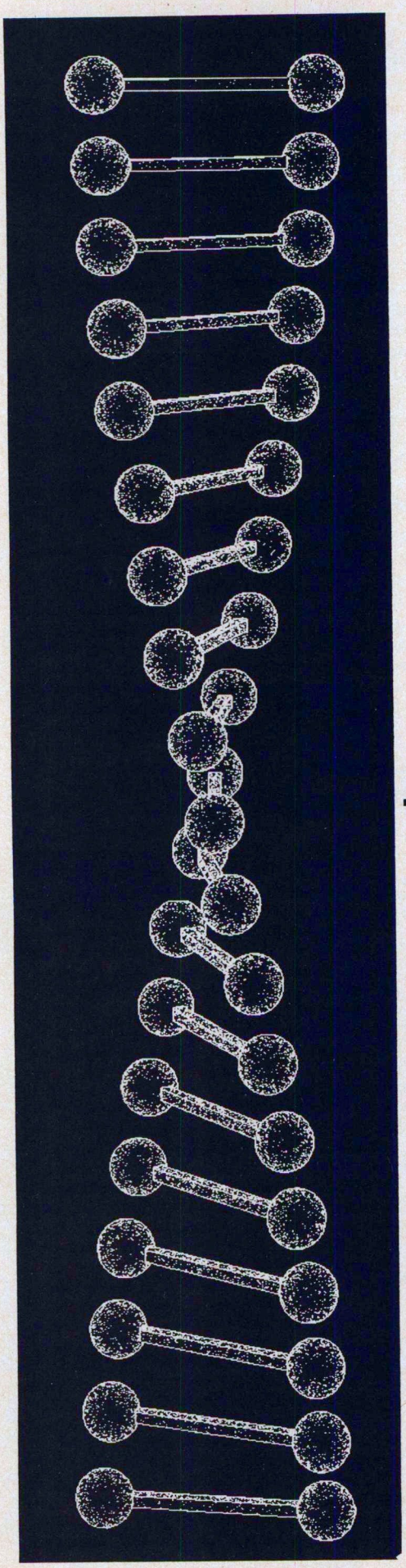

Silicon Intelligence

Michael and Lisa Storrie-Lombardi

Last month we said we'd look at:

1. Knowledge representation in an expert system, and
2. Identifying expert system boundaries.

For starters let's look at four central definitions.

Knowledge engineering:
The process of transferring human information into computer programs.

Knowledge base:
The data as well as the rules about or examples of decisions that lie at the heart of an expert system.

Inference Engine:
Programs analyzing the knowledge base and pinpointing which decision rules have been used to solve a particular problem in expert fashion.

Extensibility:
The ability to use old concepts to define new ideas and processes. For example, anyone who has played with LOGO knows that as soon as you define a procedure and make it part of your usable library it is available for use in any future program or procedure you write. What took you ten lines to describe before now only takes one word.

When a knowledge engineer begins the process of constructing an expert system, s/he first gets locked into a closet with one or more human experts in the target area. The engineer quickly runs head long into the phenomenon of the experts not knowing exactly what they know. In fact most experts have a high degree of ignorance in two areas,

1. What they consciously know.
2. How they go about the process of solving problems.

If pressed, true experts will finally relay these two pieces of information to the knowledge engineer, but they can't tell the knowledge engineer what questions s/he needs to ask them. This brings us to an exciting corollary for all of us "let's build our own expert system" folks: One of the most useful things you may gain from designing an expert system of your own may be what the process teaches you about your own expertise.

With that aside let's look at what an expert system needs to know. For openers:

1. How the individual data pieces in the knowledge base interrelate.
2. Where each piece of data fits into the larger problem-solving picture.

3. The reliability index of each piece of data.
4. What impact the chosen programming language may have on the design and limitations of the system.

Let's use the fourth element as a starting point. Remembering our long range goal in this column of gradually developing a small expert system, perhaps if we review some basic advantages and disadvantages of several popular languages, the inherent possibilities and limitations of our expert system will become more clear.

Language Choice in AI

A good A.I. language needs to include:

1. Complex data structures
2. Extensibility
3. Powerful string handling capacity
4. Ability to treat a program as a data structure

Here goes a list of pros and cons for BASIC, Pascal, LOGO and LISP. We shall use Prolog as a brief introduction to non-procedural languages.

BASIC

Con

1. Doesn't deal with lists.
2. Has no data structure comparable to lists.

Pro

1. Extremely wide availability and installed base.
2. Structured programming available in some versions of BASIC.
3. With all of its limitations, as long as you stick to rule-based expert systems you can produce quite useful and powerful tools. (See our earlier references in the March issue to the books by Chris Naylor and Forsyth and Naylor using Applesoft).

PASCAL

Con

1. Has no lists.
2. Cannot self-modify.
3. Does not really exhibit extensibility.

Pro

1. Has required structure.
2. Handles strings well.

LOGO

Con

1. In most versions a program cannot modify itself while it's running.
2. Usually slow.

Pro

1. Handles lists powerfully.
2. Manipulates strings well.
3. Highly extensible.
4. Widely available.
5. Easy to learn.

LISP

Con

1. Parentheses can drive you crazy.
2. Requires large amount of memory, both RAM and disk.

Pro

1. Handles strings well.
2. Quite extensible.
3. The granddaddy for handling lists.
4. Structured.
5. Can modify itself while running.
6. A massive database of programs exists worldwide.
7. Compiled versions have acceptable speed.

PROLOG

Instead of giving you a list of facts about Prolog, let's use it as a way to introduce concepts central to a nonprocedural language and as a jumping off place for the discussion of the boundaries of an expert

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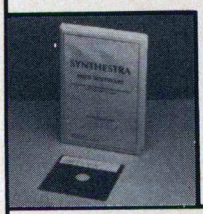

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system. The most widely available nonprocedural programming language and the language of choice for AI experimentation in the United Kingdom and France, Prolog can get us to common ground on procedural versus nonprocedural programming languages.

In the world of neuropsychology we define two concepts, crystalline intelligence and fluid intelligence. Crystalline intelligence covers all those tasks that we do many times a year (or day), usually in a fairly fixed pattern. Originally we may have had many possible solutions available but over the years we have decided that one particular procedure provides the optimal solution to a given problem. We give up flexibility for speed and reliability. Fluid intelligence includes all those activities requiring novel, creative, and experimental thought. No set, tested procedure to handle the immediate problem exists. We seem to attack the situation with a variety of associative, intuitive, random, nonprocedural strategies. We give up speed and security to find a best solution.

BASIC, Pascal and many dialects of LISP store information as arrays, lists, or some other data structure. Prolog stores knowledge as data and relationships. Programs written in Prolog don't exactly do anything, they describe relationships. You would try to tell the program as much as you know about the problem and possible solutions. Prolog would then use a variety of deductive strategies to come up with possible solutions. Prolog gives us a classic example of a "closed world" system. When solving a problem, Prolog looks at its knowledge base and considers everything else nonexistent. Prolog's world stops at the borders of its knowledge base. While we will not use Prolog in this column until it becomes more widely available, it does remind us of the importance of distinguishing crisply between what our expert system knows and doesn't know.

FIGURE 1

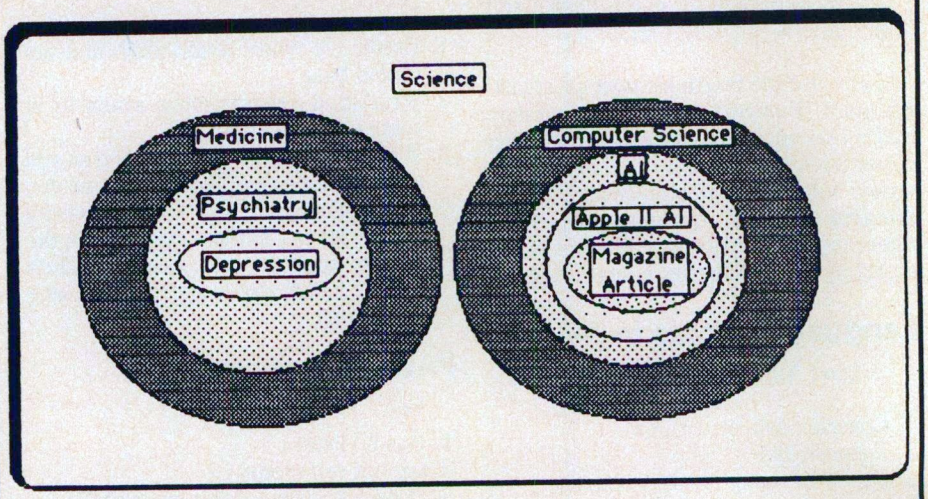

Figure 1. Domains of expertise, parallel.

An Expert?

When you first begin to design your expert system, you will essentially become your own knowledge engineer. You will then discover that we have three major ways of determining "who's the expert?." We can choose:

1. One clear human expert (us???).
2. Consensus from several experts.
3. Weighted views of differing experts.

A fourth exciting possibility does come to mind. You could design your system to attack each problem with multiple strategies. You would obtain different recommendations from the viewpoint of several different experts. You would have programmed your expert system to emulate the database and techniques of several experts with differing opinions.

Designing Your System

Once you have found your expert you now get a shot at defining your system's first boundary. You need to know about domains. For any of you who have suffered through set theory in high school and college math this will look very familiar. Take a look at these two examples.

Example 1:
If we wanted to define our expert domain in medicine we would look at medicine as a subset of all science (or art depending on how we feel), psychiatry as a subset of medicine, and major depressive disorders as a subset of psychiatry. We might then proceed to further subsets for our expert system keyed on other factors such as socioeconomic (middle/upper-middle class America), geographic (northwestern United States), etc. The subset specificity as such factors as time allocation for programming, memory and speed limitations of hardware, and exasperation quotient of the knowledge engineer (you).

Example 2:
If we wish to define our expert domain in AI, we might look at artificial intelligence as a subset of all computer sciences, Apple *II* specific programming as a subset of AI, expert systems as a subset of Apple *II* AI, and computer magazine education as the final straw — esoterically known as the destination domain (Figure 1).

Okay gang, between now and next month go figure out your own area of expertise, try to come up with a list of elements that mark the boundaries of your domain of expertise, and see if you can catalog the basics of your data, data relationships, and decision rules. Finally, if you really want to stay up all night, see if you can figure out even half a dozen components of your inference engine. If we can do all those things, you'll see another column here next month. Happy thinking!

should be about $2,000. See row 22 of our table for an example of this situation. Cell F22 uses the same @IF statement, albeit for row 22 rather than 21, and returns the value of $2,000 rather than the difference between its purchased cost and depreciated amount.

After the current value of each possession is computed, THE Spreadsheet with this template will compute subtotals in two different ways. These are reported at the end of each group of possessions — columns F and G. A grand total is computed also in two different ways, and is reported at the bottom of this template. Why two different ways? What better way to check reliability and validity than to try two different methods to make sure that you get the same answer from each method. Indeed, cell G118 will check the sum of the subtotals and the sum computed from each grouping. Any difference will yield an ERROR in cell G118. Go ahead and check cell G118 in Table 3.

Now, we can examine the rest of this template and determine a person's hypothetical net worth. As you might expect, net worth is simply the difference between what a person has (assets) and what a person owes (liabilities). I listed as many categories for both assets and liabilities as I could find. My list of assets includes such things as cash, checking and saving(s) accounts, bonds, stocks, and the personal possessions. While you will have to enter actual assets for such things as saving(s) accounts, stocks, bonds, etc., the "current value" of your possessions will be automatically listed in the appropriate cells. A summary of assets begins in cell C167 (See Table 4). If you have not modified the template, then the value for Home should be displayed. In cell F169 you will see 100000.00 displayed, or whatever value was calculated in cell F18. Similarly, each subtotal listed in your "personal possession" model of the template is listed also in this section of your "net worth statement." You will not need to enter these values again. Beginning in row 130, however, you will need to enter all other asset values. See Table 4 before proceeding further.

In the area of liabilities, we listed most of the common ones that are likely to affect you. Such liabilities as charge accounts, outstanding monthly expenses, outstanding taxes and important loans and debts must be entered directly by you. Finally, following the same principles as before, we compute the sum of the assets (cell G188) and liabilities (cell L188) using two different methods. Further, to determine net worth, we subtract the difference between assets and liabilities, and report net worth in cell L190.

Because the template results are too large to fit on one sheet of 80-column paper, you will need to use the compressed printing mode or 132-column paper. Similarly, it will exceed 66 lines, so expect several pages of output. The best way to print this output is to print it in two steps. Using the menu at the top of the template, print the personal possession part first (cells A10 through G119), and then print the net worth statement (cells C120 through L193).

Several modifications are possible with this template and each section thereof. First, obviously, you can add or delete possessions, assets, and/or liabilities. That's not too tough. Because we are using two different computational methods, you must make sure that any modifications — such as adding or deleting rows — to one section of the template does not produce an error in the subtotal row or column. Furthermore, deletions in rows in the "personal possessions" model may impact the "net worth statement," so check both before you make any decisions using your modified worksheet.

Even though we left an extra row at the top and bottom of each group of possessions, it's a good idea to check both sub-

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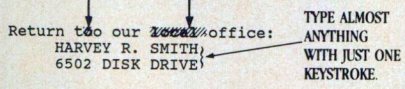


Use one keystroke to jump to the start or end of a text line. Another keystroke will erase an entire line. Change your mind? Apple-U will instantly "Undo" your last delete command!

AppleWorks Macros

MacroWorks will convert any series of keystrokes into a new one-keystroke solid-Apple command (original open-Apple commands stay intact). Use our built-in macros, or define your own. For example, make Apple-N type your name and address. Or let Apple-X save or print *all* of your Desktop files, nonstop.

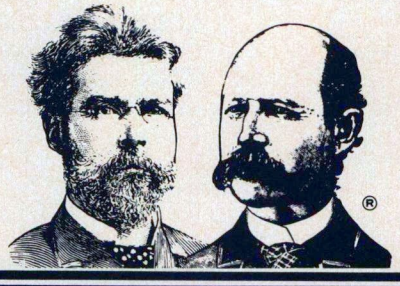
For the Word Processor, Data Base and Spreadsheet

Be creative! Set up macros to execute *any* often-repeated function. You can even skip unwanted questions like "How many copies?".

Flexible and Compatible

Use MacroWorks on a floppy disk, hard disk, Unidisk 3.5™or RAM disk. It is compatible with the Checkmate™and Applied Engineering (RamWorks™or Z-Ram™) Desktop Expanders.

MacroWorks is NOT a time-consuming "pre-boot" disk. You boot AppleWorks like you always do, but now you've got new features.



Beagle Bros MICRO SOFTWARE

3990 Old Town Avenue, San Diego, California 92110

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Multi-Column Printouts!

MacroWorks' Galley program prints your AppleWorks Word Processing files in side-by-side columns (two or three-wide) for faster and easier newsletter layouts.

Analyze Your Files

MacroWorks' File Analyzer program prints a sorted list of every word it finds, and reports the number of occurrences of each word and the average word-length. Great for making an index or for analyzing your writing style.

COUNT	WORD
10	A
1	ADDRESS
1	ADDRESSES
6	ALL
1	ALMOST
1	ALWAYS
1	WORK
1	WRITING
9	YOU
1	YOU'VE
8	YOUR

TOTAL WORDS: 402
CHARACTERS : 2013
CHARS/WORD : 5.0

Alphabetize Your Catalogs

MacroWorks' Alpha-Cat program prints a sorted two-column list of all the file names on a disk. Perfect for disk I.D. labels!

$34.95 Friendly and Unprotected

MacroWorks works with all versions of AppleWorks on any Apple IIc or 128K IIe. And you can make disk backups without hassle.

(AppleWorks is a trademark of Apple Computer, Inc.)

AD #MW2

CIRCLE 11 READER SERVICE CARD

TABLE 4

FINANCIAL STATEMENT AND ESTIMATED INCOME/EXPENSES PART OF PERSONAL POSSESSIONS AND NET WORTH TEMPLATE:FORMULAE

	D	E	F	G	H	I	J	K	L
120									
121	PERSONAL	FINANCIAL			FOR:	John & Mary	Doe	As Of:	12/15/86
122	NET WORTH	STATEMENT							
123									
124									
125		A S S E T S					L I A B I L I T I E S		
126			$$$$$$$$$$$$	Subtotals				$$$$$$$$$$$$	Subtotal
127									
128									
129	Current Bank Assets:					Current Major Liabil:			
130	Cash					Notes Due	Banks		
131	Checking					Notes Due	Relatives		
132	Savings:	Passbook				Notes Due	Others		
133	Savings:	Credit Union				MasterCard			
134	Savings:	Money Market				Visa			
135	Other					Overdraw on	Checking		
136						Other			
137									
138	Subtotal	.....	+F129+F130+F131 +F132+F133+F134 +F135+F136+F137	@SUM(F129.F137)		Subtotal	.....	+K129+K130+K131 +K132+K133+K134 +K135+K136+K137	@SUM(K129.K137)
139									
140									
141						Accounts & Bills Payable			
142						Dentist			
143	Current Cash Value of:					Accountant			
144	Annuities					Department	Store		
145	Certificates of Deposit								
146	Permanent	Life Insuran							
147	Retirement								
148	U.S. Saving s Bonds								
149	Other								
150									
151	Subtotal	.....	+F143+F144+F145 +F146+F147+F148 +F149+F150	@SUM(F144...F150)		Subtotal	.....	+K141+K142+K143 +K144+K145+K146 +K147+K148+K149+K150	@SUM(K141...K148)
152									
153	Current Market Value:					Taxes to Be Paid:			
154	Bonds					(not withheld)			
155	Investments					Federal Income Taxes			
156	Mutual Fund					State and City Taxes			
157	Options					Personal Property Taxes			
158	Stocks					Assessment			
159	Other					Self Employment			
160						Other Taxes			
161									
162	Subtotal	.....	+F153+F154+F155 +F156+F157+F158 +F159+F160+F161	@SUM(F153...F161)		Subtotal	.....	+K153+K154+K155 +K156+K157+K158 +K159+K160+K161	@SUM(K153...K161)
163									
164						Loans to be Paid:			
165						Mortgage	(home)		
166						Mortgage	(other prop)		
167	Current Market Value of:					Liens & Assessments			
168	Other Real Estate		ENTER #			Rent Owed			
169	Home		+F18			Life Insurance loans			
170	Autos		+F27			Installment loans:			
171	Computer Equipment		+F38				Appliances		
172	Household Goods		+F51				Auto-1st.		
173	Furniture		+F61				Auto-2nd.		
174	Office equipment		+F70				Computer		
175	Tableware		+F78				Education		
176	Furs, Jewelery		+F88				Furniture		
177	Antiques		+F96				Home improve		
178	Hobbies/Investments		+F106				Jewelry		
179	Misc.		+F115				Others		
180	Other					Other			
181									
182	Subtotal	.....	+F167+F168+F169 +F170+F171+F172 +F173+F174+F175 +F176+F177+F178 +F179+F180+F181	@IF(@SUM(F167...F181) <>F118,@ERROR, @SUM(F167...F181))		Subtotal	.....	+K164+K165+K166 +K167+K168+K169 +K170+K171+K172 +K173+K174+K175 +K176+K177+K178 +K179+K180+K181	@SUM(K164...K181)
183									
184						Other Outstanding Debts:			
185	Other Assets :					Stocks Bought on Margin			
186	Business	Interests							
187	Money Owed	to you				Other			
188	Mortgages	you own				Subtotal	.....	+K184+K185+K186+K187	@SUM(K184...K187)
189	Tax Refunds	due							
190	Other								
191	Subtotal	.....	+F185+F186+F187 +F188+F189+F190	@SUM(F185...F190)					
192									
193	TOTAL CURRENT ASSETS	$		@IF(+F138+F151+F162 +F182+F191=@SUM(G138.G191), @SUM(G138...G191),@ERROR)		TOTAL CURRENT LIABILITIES		$ @IF(K138+K151+K162+K182+K189= @SUM(L136...L189), @SUM(L136...L189), @ERROR)	
194									
195						NET WORTH		$	+G193-L193
196									
197	**********	**********	**********	**********	**********	**********	**********	**********	**********
198									
199		ANNUAL INCOME				ANNUAL ESTIMATED EXPENSES			
200			$$$$$$$$$$$$	Subtotal				$$$$$$$$$$$$	Subtotal
201									
202						Taxes:			
203	Salary & Commissions					Income			
204	Bonuses					Property			
205						Other			
206	Dividends &	Interest							
207						Subtotal	.....	+K203+K204+K205 +K206+K207	@SUM(K203...K207)
208	Rental & Leases (net)								
209									
210	Other					Yearly Expenses:			
211						Mortgage Payments			
212						Rent Payments			
213	TOTAL INCOME		+F203+F204+F205 +F206+F207+F208 +F209+F210+F211 +F212	@IF(F213=@SUM(F203.F212), @SUM(F203.F212),@ERROR)					
214						Church Membership			
215						Insurance:			
216							Auto		
217							Health		
218							Life		
219						Utilities			
220						Other			
221						Subtotal	.....	+K211+K212+K213 +K214+K215+K216 +K217+K218+K219 +K220+K221	@SUM(K211...K221)
222									
223						TOTAL ESTIMATED EXPENSES			@IF(K208+K222=@SUM(L208.L222), @SUM(L208...L222),@ERROR)
224									
225	**********	**********	**********	**********	**********	**********	**********	**********	**********
226	**********	**********	**********	**********	**********	**********	**********	**********	**********

totals of each section before proceeding to make any other modifications. Subtotals in column F are computed by identifying each appropriate group cell and adding them together while subtotals in column G are computed with the @SUM function. Other than taking care when you make any modifications, this section of the template will serve you well and with considerable ease.

By the way, you may wish to further modify the personal possession model to include additional information which may be essential for insurance purposes. For example, you may need to indicate physical location, purchase source, or other documentation of resale value. By adding additional columns, you can easily have all the necessary documentation that you could need and solve two problems with one template.

Finally, if you need to estimate the value of your possessions and net worth for next year, just change the year value (cell D11), make any reasonable asset and liability changes, press "!," and re-examine your worksheet. But you have probably already figured that out.

Conclusion

In the three articles of this series, we have examined basic issues in using spreadsheet software and three templates for home management. They were: FAMILY BUDGET, CHECKBOOK TEMPLATE, and PERSONAL POSSESSIONS AND NET WORTH. Each may be used directly, or you may choose to modify one or all to better fit your needs. Each was designed to help test your knowledge and illustrate the primary points made in these articles: How to (1) define a problem, (2) modify the problem so that spreadsheet software can help solve the problem, and (3) the several essential questions that must be considered if you are to be successful in constructing a reliable, accurate and valid template. By now, I'm sure that you will keep each of these questions in mind when you create your templates:

QUESTION # 1: Do I understand the problem?
QUESTION # 2: Do I wish to create a template or worksheet?
QUESTION # 3: How can I best structure the template?
QUESTION # 4: How can I best communicate my results?
QUESTION # 5: What data are needed?
QUESTION # 6: What is/are the essential formulae?
QUESTION # 7: How redundant do I need to be?
QUESTION # 8: What have I forgotten?
QUESTION # 9: What's the easiest way to build the template?
QUESTION #10: How best to test this version of the template?
QUESTION #11: What cells need to be protected?
QUESTION #12: Do I need instructions in this template?
QUESTION #13: Final warnings — recalculations?
QUESTION #14: Do I need other documentation?
QUESTION #15: How best to test the final template?

In any case, you should note that good template construction, like all things worthwhile, requires effort. Once mastered, however, considerable time and money may be saved.

Author's Note

The template net worth model used in this article was based, in part, on the models presented in *VisiCalc: Home and Office Companion,* Castlewitz, David M., Lawrence J. Chisausky and Patricia Kronberg.

SCRG SOUTHERN CALIFORNIA RESEARCH GROUP

quikLoader

The **quikLoader**™ provides *absolute* security of programs. The program can be put onto an EPROM chip, plugged into the quikLoader, and the quikLoader plugged into any slot of the APPLE™][,][+, or //e. The program cannot be misplaced, and it *will* load when needed.

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An example of a practical application is APPLEWORKS™. We can transfer your copy of APPLEWORKS for an additional $89.50, and the program will be up and running within 2 seconds after turning on the computer. There is no need to use either the startup or program disks.

The quikLoader provides many other benefits. As soon as power is applied, DOS loads automatically from the card. Included with the quikloader are the popular programs FID and COPYA. These programs, as well as any that you add, will show on the catalog screen. The program is selected with a single keypress.

Installation is easy, just plug it into any peripheral slot. It will work on a APPLE][,][+, or //e.

$179.50

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PROmGRAMER™

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The PROmGRAMER is an inexpensive **EPROM** programmer for the **APPLE**][,][+, and //e computers. The unit plugs into any slot of the computer, and allows programming any standard 5 volt, 27 series **EPROM**. The ZIF socket allows rapid programming, copying, duplication, or modification of **EPROMs**. **$149.50**

SLOT 3 CLOCK™

The **SLOT 3 CLOCK** is designed to plug into slot 3 of the //e *without* interfering with auxillary memory. **PRODOS**™ is fully supported, and the card is APPLESOFT™ compatible. Installation software and long-life lithium battery are included. designed by Chuck Shaffer **$79.50**

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The SWITCH-A-SLOT is an expansion chassis, which allows the user to plug in up to four peripheral cards in one slot. One of these cards is selected for use, and *only* that card draws power. **$179.50**

SWITCH-A-SLOT and **EXTEND-A-SLOT** work well with most slow to medium speed cards. They are not recommended for high speed data transfer devices.

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The **EXTEND-A-SLOT** brings a slot outside your APPLE™, allowing an easy change of cards. **$34.95**

9-16 Adapter **for APPLE //e & //c**

This permits the use of most 16-pin I/O devices with the APPLE //e or //c. The only limitations are those devices that use the annunciators or the $C040 strobe. **NOTE:** The //c does not support the use of two joysticks. **$14.95**

16-9 Adapter **for APPLE][and][+**

With this adapter, owners of early APPLEs can take advantage of the newer 9-pin game products, such as joysticks, **MUPPET LEARNING KEYS**™, etc. **$14.95**

BOOKS BY JIM SATHER

Understanding the APPLE][- The definitive source of information about how the APPLE][works. Forword by Steve Wozniak. **$22.95**

Understanding the APPLE //e - This companion volume covers the additional information needed to know details of the computer hardware. **$24.95**

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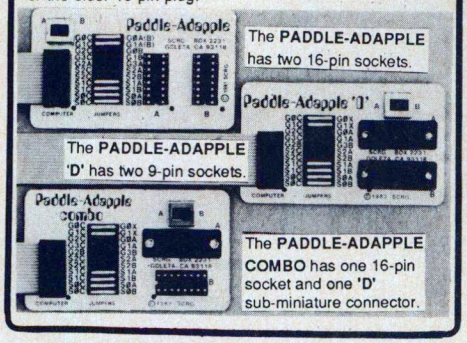
The **PADDLE-ADAPPLE** game expansion adapter plugs into the 16-pin interior game I/O socket, and allows you to select between one of two devices, or use two joysticks for games such as **ARCHON**™ and **ONE-ON-ONE**™. **$29.95**

There are three versions to adapt to any combination of the newer type APPLE connector (the 9-pin D sub-miniature), or the older 16-pin plug.


Paddle-Adapple
The PADDLE-ADAPPLE has two 16-pin sockets.
Paddle-Adapple 'D'
The PADDLE-ADAPPLE 'D' has two 9-pin sockets.
Paddle-Adapple COMBO
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Bruce F. Field

FAST GARBAGE COLLECTION

Q. *I have heard there is a program in the public domain which speeds garbage collection in Applesoft. To date I have been frustrated in obtaining the specific reference for this code. Can you help?*

A. The program you are looking for was written by Randy Wiggington and was originally published in *Call -A.P.P.L.E.*, January 1981, pp. 40-45. It was republished in *Call -A.P.P.L.E. In Depth*, Volume 1, "All About Applesoft," pp. 25-33. A couple of corrections have recently been discovered by our readers and reported in this column. First, the SBC STREND at line 55 in the "All About Applesoft" (AAA) version should be SBC STREND+1; the original version is correct. Secondly, as published the routine works, but actually goes through the garbage collection process twice each time garbage collection is required. The solution is to remove the JSR NZTAB at line 60 AAA version, line 59 original version, and insert a JMP NZTAB immediately before the line labeled FNDVAR2, line 65 AAA version, line 64 original version.

The code for all the routines in "All About Applesoft" is available on diskette from A.P.P.L.E. Co-op, product code SIN1, for $16.50. The "All About Applesoft" publication is available for $7.00. Both prices are for A.P.P.L.E. Co-op members, non-members add 10%.

Mike Salzman wrote with an interesting observation on this same topic:

"I have been using FAST GARBAGE COLLECTION for some time now. I wanted to hear how often garbage collection was taking place, so I added the JSR $FF3A after line 59 when I changed STREND to STREND+1. I would get a beep if I called fast garbage from the keyboard, but not from within my program. The problem was the bell call $FF3A. If your current output device does not have a bell, you will not hear the call. The bell call at $FBDD is not dependent on the output device and would beep under program control. For awhile I thought Rod Serling had come to visit me."

Good point Mike, the problem is that the subroutine in the monitor at $FF3A just sends the ASCII bell character ($07) to the output device. The software for the screen traps this character and calls the routine at $FBDD that actually beeps the speaker. Some printers and other devices just don't bother with the bell.

APPLE-IBM CONVERSION WITHOUT A MODEM

Q. *I have an IBM PC at work and an Apple at home. I'd like to find a way of transferring data from my PC so I can work at home on it with the Apple. I know that one way is to use a modem but our security regulations do not allow us to connect modems to our machines.*

A. It just so happens that there is a product called Turnover that consists of a half-size card and software for the PC that allows the PC to read and write 5¼" disks in Apple format. It is produced by Vertex Systems, Inc., Suite 3, 6022 W. Pico Blvd., Los Angeles, CA 90035, tel. (213) 938-0857. You need two floppy drives, or a floppy and hard disk on the PC. The Turnover board plugs into the PC, the standard PC floppy disk drives are plugged into the Turnover board, and a small jumper from the Turnover board plugs into the original disk controller board in the PC. When disabled, the board is transparent and the PC functions as a normal PC. When the Turnover software is used you can transfer files written in Apple DOS 3.3, ProDOS, Softcard CP/M, Apple *II* Pascal, and Apple *III* SOS, to an MS-DOS formatted disk. Similarly you can initialize a disk in Apple format and write selected PC files to it in DOS 3.3, ProDOS, CP/M, or *III* SOS format.

A utility program is also included to modify the MS-DOS files to strip the high

bit, add or remove line feeds and carriage returns, or replace strings. This is claimed to permit Apple Visicalc files to be used with Lotus 1-2-3. There is also a utility to convert Apple binary files to MS-DOS binary files by stripping off the address and length header of the Apple binary file.

Of course, this may be only part of the problem. If you are interested in transferring ASCII text files then Turnover should work fine. If you need to transfer specially formatted files, i.e. database or spreadsheet files, additional manipulation of the files may be necessary and require that you or a knowledgable person write a special program to do the conversion. This may be more trouble than it's worth; dump the PC at work and get another Apple.

IIc SERIAL PORT SETTINGS

Q. *I need help in setting the serial ports on my Apple IIc to use with an odd-ball printer. Booting the System Utilities disk does this until the next cold start, but it takes forever and means interrupting the work I'm doing. I have tried setting the port from BASIC by issuing a control-D and PR#1 followed by control-I and the appropriate codes for the port. I've tried this several ways, on startup before loading ProDOS, from a BASIC program, and as direct commands with BASIC in RAM. Each time it works once, but after I return to the monitor, it seems to forget the serial settings, as if I had done a cold start. Do you have any suggestions?*

A. Once you set the ports the settings should remain undisturbed until you do a cold start or a program modifies them. Possibly one of the programs you are using is changing the settings.

One way to simplify the setup procedure is to create a text file that contains the necessary codes. You can use any word processor that creates standard text files. Type in the commands exactly as you would if you were typing them directly from the keyboard in BASIC. Save the file with some easily recognizable name such as "serial.setup." Whenever you want to setup the port type "EXEC serial.setup" from the Applesoft prompt. This will replay the commands in the text file and setup the port. You can also use the file from a BASIC program using the control-D character, i.e. 100 PRINT CHR$(4)'EXEC serial.setup'.

PRINTER PROBLEMS

Q. *When I use my Okidata printer in correspondence quality mode, the top of the lower case a is curled down. Is this a printer problem?*

A. Yes, in a way. In correspondence mode, the Okidata makes two passes for each letter with a small line feed in-between the passes. Sometimes the line feed does not move the paper correctly. Check that there is very little play in the platen. If you're using pin-feed paper, make sure the friction feed rollers are disengaged. Excessive friction in pulling the paper into the printer can also cause a problem. It might help to move your stack of paper so that it doesn't get caught on anything on its way to the printer. There is always a little backlash in the gears so that when you turn the platen knob to adjust the paper, the next line feed is likely to be incorrect. To eliminate this, do a line feed before printing anything. The Imagewriter also has this problem.

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Our sons have now switched (from AppleWorks to the BARD). The Spell Checker was instrumental in this decision. I am an article writer for magazines . . . and write every day. The BARD (Professional level) has made my work easier and fun again! One simply sits down and uses the BARD. A few checks here and there . . . the program rolls. I learned it in about a half hour and have been using it ever since. The speed of the editing and formatting keeps me moving . . . the "Quick" function macros let me keep a barrel of usable goodies a keystroke away. The simple use of different printer fonts unleashes the printer (this is the first program which included my Gemini 10x as a regular part of the program).

Thank you for living up to your advertising and the support you offer. Please consider me an automatic new customer for any of your new products. Just send them along." *(The Rev. Philip G. Houghton, Waynesburg, PA.)*

"I congratulate you and your staff for a marvelous program that everyone who owns an Apple (IIe/c) ought to have. *(Alex Golsalves, San Francisco)*

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CALL WAITING AND BBSs

Q. *I have Call Waiting service on my telephone but whenever I am using my modem with a BBS and a call comes in it disconnects me. Is there anything I can do about this?*

A. When the other call comes in it temporarily disconnects the line and the modem hangs up because the carrier from the other modem has disappeared. With some modems (Hayes, Hayes compatibles, and possibly some others) you

can set the amount of time the modem waits after loosing the carrier to when it hangs up. Of course it has to be set long enough on your modem and on the BBS modem.

APPLEWORKS PROBLEMS

Q. *When I print out two columns using Appleworks, the margins come out ragged even when I put a carriage return at the end of each line.*

A. Check that the width of an "m" character is the same as for an "i" character. Your printer may be set for proportional size characters. Appleworks assumes all the characters are the same width.

Q. *I have the newer version of Appleworks and, as you can see from the top line, I am having problems. I just need to get rid of the "0N" that gets printed on the top of the first page. For hardware I have an enhanced IIe, Wesper Micro "Wizard-SOB" serial buffer card, and a Diablo 620 printer. None of the manuals give a clue as to proper control codes. Do you by chance have an answer?*

A. I think I've answered a question like this before but, since it seems like a common problem, once more won't hurt. As long as you are using version 1.2 or later, it shouldn't be difficult to fix it. Appleworks sends an initialization string to the printer interface card when it first begins printing. The default value for this string is control-I 80N and this is supposed to be trapped by the interface card and set it to print 80 columns on the printer with the video display turned off. Unfortunately, not all interface cards recognize this command. Despair not, it is relatively easy to change it in versions 1.2 and later. From the main menu select (5) Other Activities, then (7) Specify information about your printer(s), choose Change printer specifications for your printer, under Change a Printer choose (5) Interface cards. Follow the instructions to change the control characters, control-I 80N. When asked to type the exact control characters required, type 5E ( ) to end the string with nothing in it. This will probably work with your interface card. If you still have problems, you might try setting the string to control-I 0N as this has been reported necessary for some interface cards.

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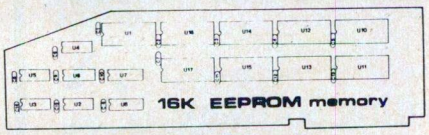

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DISK DRIVE TROUBLESHOOTING

Q. *My Duodisk drive occasionally gives me I/O Errors and then I find that the disk I'm using has bad blocks. Usually the bad blocks are on track 0. Before I take a trip to the dealer is there anything I can do?*

A. I suggest that you turn off the power to your Apple and disconnect and reconnect all the cables to your disk drive. Also remove and re-insert the disk controller card. The connectors develop an insulating oxide layer that can cause intermittent failure. You could also clean the edge connector on the bottom of the disk controller card using a soft pencil eraser; be sure you wipe away all the erasures with some isopropyl (rubbing) alcohol.

If you have problems reading a disk, especially disks written awhile ago, or disks written on another machine, the problem may be the drive speed and can be measured using any of a number of public domain disk drive speed programs. Track 0 is only written at initialization time. Since you are finding bad blocks on track 0, presumably with the drive that isn't suspect, it sounds like you have an interrmittent failure that causes the bad drive to write to the disk when it should only be reading or writing to the wrong track. That's why I suggested the contact problem. Alignment of the read/write head in the drive should only affect tracks that are currently being written, and should not trash other tracks. Adjustment of the head should be done by a dealer anyway.

TO RAM OR NOT TO RAM?

Q. *I'm thinking of adding a large Ram card, but all that I'm reading about them has me confused. I understand that not all programs work on them and thus I'm trying to figure out if it's worth buying one of these cards. What kind of programs make use of these Ram cards?*

A. You are right that not all programs work with all Ram cards. Adding a Ram card to your Apple does not automatically increase the amount of memory available for all your programs. Each program must be written specially to use the extra memory. And, Applesoft won't use it at all unless you buy a special patch program for it. Unfortunately (except for the extended 80-column cards for the IIe), different manufacturers use different methods for accessing the cards so even if a program works with a card from one manufacturer it may not work with a different brand. One solution is to use a "pre-boot" disk that Ram card manufacturers supply to modify popular software to work with their cards. For example Applied Engineering supplies software to modify Appleworks so that it can use their Ram cards up to 3 megabytes.

My recommendation is NOT to buy a Ram card until you know what software you wish to use with it. Spreadsheets are the most popular reason for adding memory, data bases probably come next. Once you have decided what program you are going to use, select a Ram card that works with that program.

PROS AND CONS OF HARD DISK-ING IT

Q. *I use my computer to mainly keep track of my finances and telecommunications. I also have a number of games. Do you think an Aple Unidisk 3.5 would be better for me than say a 10 MByte Sider?*

A. I really think that must be your decision, however I can give you my philosophy on the subject. The Sider is of course a hard disk, and most hard disks on the Apple don't really have any convenient method for making backup copies. It just takes so many floppies and so much time that people don't bother. The one exception to this is the new B-Sider unit that provides tape backup for the Sider and Sider II. Anyone who stores unrecoverable data on a hard disk without backup is looking for trouble. The only useful purpose I see for a hard disk without backup capability is to transfer programs to it from floppy disks so they are readily accessible. When (not if, but when) the hard disk fails, the programs can be reloaded from floppy. If, on the other hand, you mostly use one or two programs that require large amounts of data, the 3.5 Unidisk may be a better deal. Be sure you get two, though, so you can make backups.

I get any number of calls from people asking if its easy to recover data from a damaged diskette. I reply, "Sure, just get out your backup copy."

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Write A.P.P.L.E.

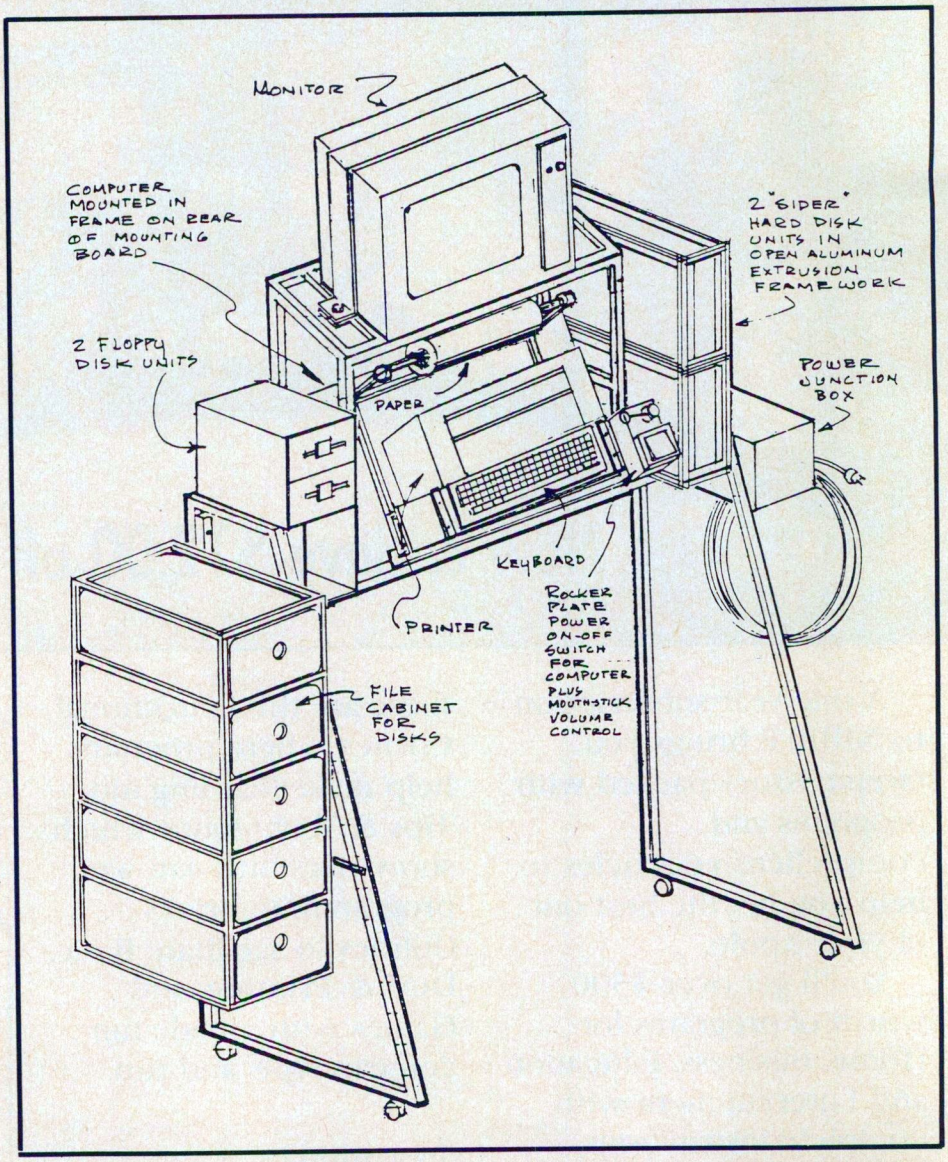
Readers' forum

More Help For Rodney

In September 1984 you published an article describing how a disabled boy named Rodney acquired and was helped in the use of his Apple. I was interested because my son, Tero, also got to use an Apple under somewhat the same conditions. Tero got his first Apple in 1978, and upgraded to an Apple *//e* a bit over a year ago. At the time your article appeared, it seemed that Rodney was in good hands, and there was little I could contribute. Recently, I completed a set of rough drawings for another quadraplegic patient which details Tero's setup, and it occurred to me that Rodney might find some of my ideas useful. Since there was no direct address for him, I decided to send the drawings to you, and you can pass them on to him. My only proviso is that design rights remain with me, although Rodney, or anyone else who might find the ideas useful, can borrow freely for their own construction. I am in the process of compiling a book describing Tero's experience as a C-3 quadraplegic since the age of three.

Jan Sand
Helsinki, Finland

We have passed on the set of 21 detailed drawings to the article's author (and Rodney's computer mentor), Sheryl Blix, who is now Manager of the Microcomputer Support Group at the University of Washington in Seattle.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Pascal 1.3 with ProFile

I was glad to see the Pascal 1.3 review by Donald J. Geenen in the May, 1986 issue. For a while, I had thought A.P.P.L.E. had given up on Pascal.

Mr. Geenen should be pleased to know that he can still use Pascal 1.3 with the Pascal ProFile Manager. Apple plans to release the Pascal Device Support Tools in a Pascal 1.3 version which provides a new SYSTEM.ATTACH module for this purpose. The SYSTEM.ATTACH module provides Unit #128, which is a block device driver for all block oriented devices such as the ProFile (with intelligent controller boards). Developers are able to obtain the update via licensing from Apple Computer.

With the Version 1.3 SYSTEM.ATTACH, PPM can then read the partitioned ProFile and find the PASCAL.AREA in the ProDOS volume directory. I have successfully installed Pascal 1.3 on my ProFile and boot from a 3.5 inch floppy which then switches to the hard disk. The Volume Manager Unit still works, as does the backup and restore functions. However, the Extended Filer no longer works. This is no big loss since the Version 1.3 Filer is as good or better.

Mr. Geenen did make one mistake regarding the UniDisk 3.5. The Apple *//e* does NOT require a ROM upgrade. The *//c* does require the ROM update.

Also, I believe that Apple FORTRAN will work with the Pascal 1.3 operating system simply by applying an updated version of the system level check that was supplied to use FORTRAN with Version 1.2.

Ken Kashmarek

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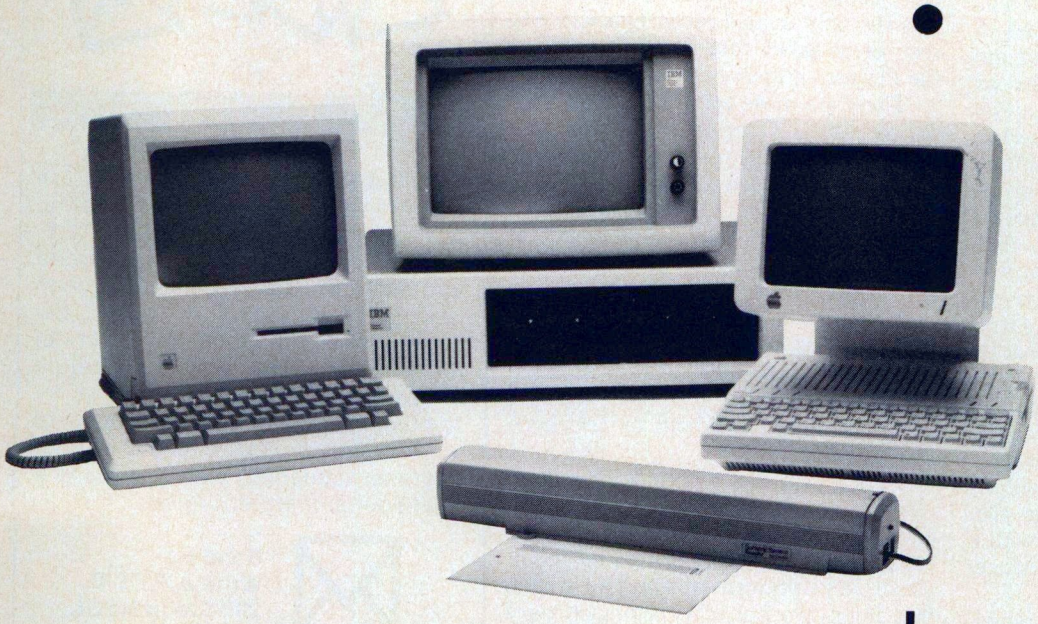

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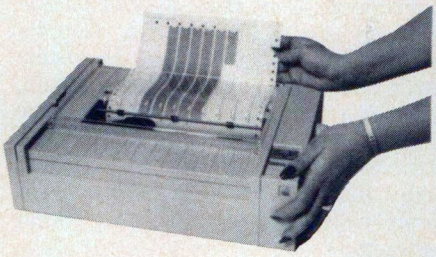

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Pinpoint Experiences

I have been using the Pinpoint Desk Top Accessories with AppleWorks for some time now on an Enhanced Apple *IIe* with the Applied Engineering RamWorks 80 column card with 100k installed, a buffered Grappler Plus interface card, and an Epson RX 80 printer. The Pinpoint approach to enhancing AppleWorks or Basic.System does have merit. The possibility of running a spelling checker from within AppleWorks is exciting and the ability to add additional accessories will allow great flexibility in the future.

However, there seems to be a flaw within Pinpoint. I have had several versions of Pinpoint and have yet to have the Graphmerge function work correctly with my combination of hardware. That is specifically the Epson RX 80 and the Grappler Plus. According to the people at Pinpoint, once Pinpoint is installed, the Pinpoint Printer Enhancement kit is used to select printer type and interface card set up. Also, the original graphmerge file, Graphmerge.pp, is to be replaced with a new version from the Printer Enhancement Kit.

With all of the installation completed, with pre version 1.2e of Pinpoint, using the Graphmerge from Basic.System or AppleWorks would result in a properly printed graphics and text but the system would crash. If you were in Basic.System, the cursor would never return after the screen display was restored. The code in Basic.System at $ABF1 is unrecognizable with a BRK at $ABF7. Basic.System was never re-entered, the code was never restored.

Using Pinpoint version 1.2e from basic, Graphmerge.pp apparently works as it should. The graphic/text print properly and the cursor returns. All seems normal. However...

I have never had a disk crash. I have never had the mysterious track zero crash. Using Graphmerge from Basic.System I had two track zero crashes. Both trashed two sectors on track zero. At least on one of those crashes sector 3 and 7 were destroyed (as reported by Filer). If the Graphmerge.pp file is locked, the screen display is hi-res garbage and the Apple reads the disk forever, but lets us know that it is choking with periodic clicks from the speaker. Reset drops things into monitor limbo and even if the drive door was open before the reset, the disk is track zero garbage. If memory serves correctly (mine not the Apple's), the Graphmerge.pp file is also apparently adulterated.

From AppleWorks, all of the versions of the Pinpoint, the graphmerge function seems to behave the same. Once again, the text/graphic print normally on the printer. The AppleWorks screen is restored. If there are several items on the desktop and you switch to another word processor document or the data base, for example, and then back, the help screen does not work. There is only a flutter on the screen when open-apple-? is pressed. If you try to go anywhere else the Apple locks up. Data on the desktop that wasn't saved is unavailable. If you think June Lockhart was the only thing Lost in Space, try to recover un-saved data from the wrath of the Pinpoint graphmerge.

There are these and other quirks with the accessory. There is no place for programs, utilities, enhancements or whatever that cause the potential loss of data. This is true of data in memory which is being massaged but even more true of disk data, the stuff stored, archived for later reference.

Pinpoint's technical reference people are courteous, approachable and helpful. They did not and as yet have not informed me of the solution to the problems above. I have contacted them both by telephone and via letter.

I am a user, not a programmer. I am relating the general trend of things which have happened with Pinpoint. Pinpoint has potential. If you are using Pinpoint or plan to, see if you can use it on your system first. It may work on other combinations of hardware that I do not own. If you have the Epson and Grappler, be cautious using version 1.2e with its graphmerge.

Dennis LaMonica

Request for Printer Configuration Programming

Recently I have developed an enhancement for the Apple Writer *IIe/c* so that this word processor can now be used to print various graphics along with text (see my ad in the unclassified section in recent issues). In addition, any number of fonts or character sets can be used during the printing of a document without reloading the word processor. This Enhancement and the supporting graphics utilities are configured for the Okidata 92P dot/matrix printer, the only printer I have. I have received a number of inquiries from people with other dot/matrix printers (Imagewriter, Epsons, etc.), and I would like to make these programs available to them as well. I would welcome help from knowledgable (*Call -A.P.P.L.E.*) readers who would be interested to interface these programs to other dot/matrix printers that they are familiar with. I would provide the source code for the interfacing routine and other necessary information. In return for the tested code, I would refund the full price of both programs. Please call or write!

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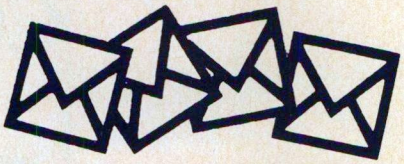

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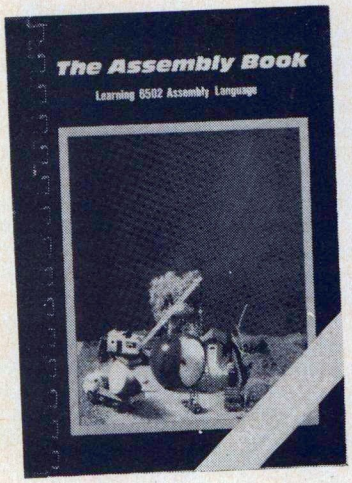
THE MARKETPLACE

The following items are selected by our editorial staff from the large number of product announcements and news releases sent to us daily. They are presented solely to keep you informed about the current market for Apple related hardware and software. As we have not tested many of these products, appearance here does not necessarily represent endorsement or recommendation by A.P.P.L.E. Further information about items appearing in The Marketplace can be obtained through the Reader Service Card. If you contact any manufacturers directly, please mention that you learned about them in *Call-A.P.P.L.E.*

THE ASSEMBLY BOOK



Grynberg Publishing Corporation announces "THE ASSEMBLY BOOK," by Mike Westerfield and Peg Smith. This is a resource package for learning 6502 assembly language on Apple II Personal Computers. The package consists of text, ORCA/EZ Assembler software, and manual. This is a fresh approach to the subject, comprised of a full length, classroom tested tutorial, software assembler manual, and assembler software — all in one package, all in one place.

Since 1984 many revisions of the manuscript have been made. Some changes were made in response to classroom testing carried out to calibrate the content and presentation of materials. The chapters of the book are designed to occupy a two-hour class session. Price: $29.95. *Grynberg Publishing Company, 5000 South Quebec, Suite 500, Denver, CO 80237, (303) 850-7497.*

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RESEARCH STATS PACKAGE

The HISTOGRAM PLOT, a statistics package for Apple II, *II*e and/or compatible computers is now available from ANDENT, Inc. HISTOGRAM PLOT is an easy-to-use statistics package for the researcher, student, and business person in need of a quick and simple-to-use statistical data system. It features Input, Edit, Print, Save date, Variable graph size, Demonstration files, and an eight page manual. It will display and/or print out Raw and Computed Data, Mean, Median, Standard Deviation, Expected Cell Frequencies, and Actual Cell Limits and Frequencies. This package can be copied for back-up and can also be modified by the user. Price: $29.00. *Andent, Inc., 1000 North Avenue, Waukegan, IL 60085.*

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SOLVE THE MYSTERY

Activision, Inc. announces the release of Murder on the Mississippi, a 19th century murder mystery set on a Mississippi riverboat. The Company has also announced the national Murder on the Mississippi contest, whose winner will receive a trip for two down the Mississippi River.

Murder on the Mississippi takes the computer user on an exciting and entertaining investigation on the Delta Princess riverboat in search of a murderer. Two of her vacationing passengers, Sir Charles Foxworth, famous British sleuth, and his constant companion, Regis Phelphs, have discovered a body, and the user must guide them throughout the riverboat searching for clues and examining suspects.

Designed by Adam Bellin, the title is formatted like an illustrated text adventure. However, Bellin has created an original form of interface between the computer and the player which is completely joystick driven.

During the Delta Princess' three-day journey down the Mississippi River, Sir Charles and Regis must explore the riverboat's four decks and twenty-four rooms where they will cross-examine eight fascinating suspects. Building the case correctly is a must, since a false accusation may result in serious consequences for Sir Charles. Though simple to use and filled with entertainment, Murder on the Mississippi requires careful evidence collecting before the murderer can be identified.

Activision will sponsor a drawing which will provide both consumers and retailers the opportunity to take a real cruise on the famous Mississippi Queen.

Consumers may qualify themselves and the retail outlet from which they purchase Murder on the Mississippi when they fill out an entry form and send it to Activision. Retailers may also qualify for a separate drawing by setting up a display, running an advertisement or promoting Murder on the Mississippi during the contest period. Details of the contest will be available inside specially marked boxes of Murder on the Mississippi and at participating retail outlets. Price: $39.95. *Activision, Inc., 2350 Bayshore Frontage Road, Mountain View, CA 94043, (415) 960-0410.*

CIRCLE **33** READER SERVICE CARD

EXPLORING LOGO

More Explorations with Logo for the Apple moves beyond creating simple shapes and designs to some of the more powerful programming features of Logo.

Building on familiar skills, such as making shapes and designs, this book describes how to create spectacular graphics with variables and coordinates, as well as how to use one variable, more than one variable, and the RANDOM command. In addition, how to fill in shapes is thoroughly explained. Other topics include using the coordinate system with variables, and debugging and refining procedures.

The book includes a handy section, "Getting in Shape," for review and practice of fundamental skills such as making shapes and designs, and editing and saving creations. Appendices include a summary of Logo commands, a glossary, additional reference, a hint section, tips on using the printer, and additional features of Logo programming. Price: $14.95 (paperback). *Hayden Book Company, 10 Mulholland Drive, Hasbrouck Heights, NJ 07604, (201) 393-6306.*

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MODEM MGR™

MODEM MGR is a new modem communications program for the Apple][+, //e, enhanced //e, and //c. It supports most serial cards and internal or external "smart" or dumb modems at baud rates from 110 to 19200 baud.

MODEM MGR provides a large buffer to capture received text for reviewing, editing, saving to a disk file, or re-transmitting.

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MODEM MGR is fast. With a Videx 80-column card, it will receive and display ordinary text at baud rates up to 19200 baud continuously (non-stop) without losing any characters.

MODEM MGR supports Apple 40-column, Apple 80-column, Videx Videoterm or Ultraterm (all eight video modes), most printer, serial, multi-function, and modem cards, most external "smart", auto, or dumb modems, and some clock cards. The programs are supplied on both sides of three 5-1/4" disks (six sides) and are not copy protected. Instruction manual (284 pages) and both DOS 3.3 and ProDOS versions for only

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MORE PRODOS ENHANCEMENTS

Nite Owl Productions has released the second product in Nite Owl's developer disk series, Developer Disk #2. It contains programming tools and program building blocks designed to help both novice and experienced programmers create more powerful and friendlier programs for the Apple II Computer.

This double sided diskette contains seven new programs, on screen help files, demonstration programs, and exercise files. Customers will be able to use Nite Owl's enhancements with their own programs without additional licensing or royalty fees.

The Director — adds a Directory command to ProDOS. The command displays a "Directory Map" of all mounted ProDOS volumes and their subdirectories, then allows the computerist to select a Pathname using the arrow keys. The computerist can CATALOG any online directory, and "Quick Index" directories to RUN programs or TYPE text files from the directory map.

Gofer — enhances ProDOS to provide a new "Structured" approach to Applesoft programming. Applesoft statements such as GOTO "MENU" and GOSUB "Print Report" are allowed. Additional ProDOS commands are also included to switch between "Routine Names" and normal line numbers.

Stickit — adds new ProDOS commands which add machine language routines directly to Applesoft programs that can then be accessed with CALL statements. A library containing nine relocatable machine language routines is included on disk.

Window — allows Applesoft programs to create a window on the screen, print information within it, then remove the window leaving the original screen display unaltered. Includes easy to use commands with minimal memory consumption.

File Copy — provides new ProDOS commands to copy files from one directory to another. Commands can be used directly from the keyboard or from within application programs. New commands are included to install and remove the internal/RAM/ disk.

PUP — ProDOS Utility Program is a powerful disk zap editor. It also includes a machine language editor, disk map, disassembler, and hex / decimal / ASCII / binary conversion functions. Several exercise files are included to help the computerist learn how to use PUP to edit disk blocks, undelete files, and utilize its other functions.

PDA — ProDOS Directory Alphabetizer allows the computerist to sort any ProDOS directory or subdirectory.

This product comes complete with a comprehensive instruction manual. It is packaged in "LAMPAK" disk mailer which is ideal for mail order distribution. Price: $39.95. *Nite Owl Productions, 5734 Lamar, Mission, KS 66202, (913) 362-9898.* CIRCLE **35** READER SERVICE CARD

DESIGN AID

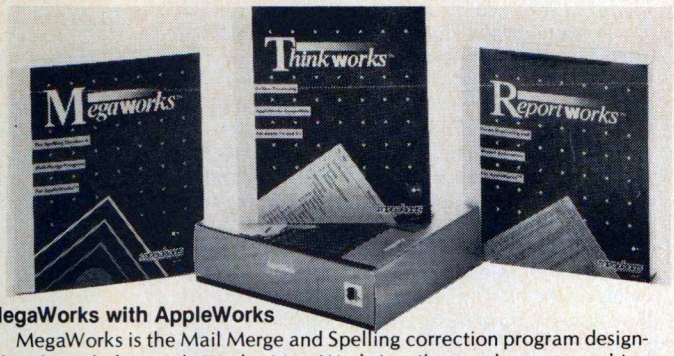
Students, engineers, experimenter—this is a DESIGN AID that allows your personal computer to power *and* control your designs, in virtually any language. (Sample control programs written in BASIC are supplied.)

Specifications

Inputs:	two (8) bit TTL ports one (8) bit counter
Outputs:	two (8) bit TTL ports three (16) bit timer-counter channels (write only) three xtal controlled clock outputs
A/D:	A/D converters: four (8) bit channels D/A converter: one (8) bit channel
Audio:	300 mw audio amplifier with speaker
Bread-boarding area:	896 pin solderless bread-board
Power:	Outputs available at +/-5 and +/- 12 vdc at 4 watts max
Interface requirements:	Three wire RS-223 (no handshaking) at 300 to 19200 baud (selectable)
Power requirements:	12 vac at 1 Amp (UL approved 110 VAC 60hz)
Size:	7.5" x 3.5" x 1" at 1.5lb.
Price:	$179.95 + $3.50 shipping

Fisher Instruments, Suite 205M 15127 N.E. 24th, Redmond, WA 98052.
CIRCLE **36** READER SERVICE CARD

PROGRAMS ENHANCE APPLEWORKS



MegaWorks with AppleWorks

MegaWorks is the Mail Merge and Spelling correction program designed exclusively for Apple Works. MegaWorks' mail merge lets you combine information from AppleWorks database files with word processing documents to print personalized form letters. MegaWorks' spelling checker corrects misspelled words in documents and allows you to customize its 40,000 word dictionary with 10,000 more words of your own. Both mail merge and spelling correction maintain word wrapping and pagination of documents.

ReportWorks with AppleWorks

ReportWorks is the powerful report generator that uses your AppleWorks files to print lists, fill out forms and analyze your data. In fact, ReportWorks allows you to produce just about any kind of report in any kind of format. And ReportWorks can add tax, look up prices, calculate discounts, enter client information automatically and much, much more. Now with AppleWorks and ReportWorks you can:

- Fill out any form, including purchase orders, invoices and more
- Calculate and print estimates and proposals
- Analyze and summarize lists and other data

ThinkWorks with AppleWorks

ThinkWorks is the powerful stand alone outline for Apple II, that also works with AppleWorks. Use ThinkWorks to organize any kind of information: lesson plans, reports, lists and proposals.

ThinkWorks is the only outline processor that allows you to combine outlines, and to include an outline inside an AppleWorks word processing document. Price: $135 each or all three for $375. $10 Demo disk available. *Megahaus, 5703 Oberlin Drive, San Diego, CA 92121, (619) 450-1230.*

CIRCLE **37** READER SERVICE CARD

UPGRADE YOUR II

Impossibilities is now upgrading Apple II's, Apple II+'s, Franklins and Basis 108's to enhanced Apple *IIe*'s. We guarantee complete software and hardware compatibility with the enhanced Apple *IIe*.

The upgrade includes a new keyboard that is identical both in function and appearance to the Apple *IIe* keyboard and a new motherboard which is functionally identical to the Apple *IIe* motherboard.

In order to achieve 100% software compatibility and to avoid copyright infringements, *Impossibilities* uses original CD, EF and character ROMs from Apple *IIe* enhancement kits. *Impossibilities* also uses the 65C02 from the enhancement kits in each upgraded computer.

The price is $399 for all computers. A built in numeric keypad can also be ordered for an additional $49. The built in keypad is free for people upgrading computers which already have built in numeric keypads. Since 80 column cards and 16K cards designed for use in Apple II's, II+'s and compatibles will not work in Apple *IIe*'s, *Impossibilities* will trade an Apple *IIe* compatible 80 column card for the purchaser's 80 column card or an extended 80 column card for the purchaser's 16K card and 80 column card.

People wishing to have their computer upgraded should remove all peripherals from their computer (including any built in disk drives) EXCEPT 16K cards and 80 column card which they wish to trade. After removing the peripherals they should carefully pack their computer and a check or money order for either $399 or $448 and mail it to *Impossibilities*. *Impossibilities* will pay the return postage to anywhere in the continental U.S. People living outside of the continental U.S. should enclose enough extra to cover the return postage. As a precaution, all computers should be shipped registered and insured — *Impossibilities* will return all computers registered and insured. Upgraded computers carry a thirty day limited warranty. *Impossibilities* will do service work on computers once the warranty is expired. *Impossibilities, 215 N. Terrace, Wichita, KS 67208, (316) 683-7419.*

CIRCLE **38** READER SERVICE CARD

EquiDisk+™

We've got a lot in store for you!

The EquiDisk+ is the next generation in 5¼" floppy disk storage — and it's here today! Unlike your old Apple drives that were probably too small for any real work, the EquiDisk+ dual drive system gives you over 1.6 megabytes of immediately accessible on-line storage. Now you can store over 8 megabytes of data with that box of diskettes sitting on your shelf. That's over 3500 double-spaced pages, or 70,000 names and addresses, or complete payroll information for more than 4000 employees. And with that second box of diskettes on your shelf you can back it all up — 800K on each disk.

More than just Storage!

+ The EquiDisk+ works with DOS 3.3, ProDOS and CP/M.
+ Standard 5¼" diskettes are all you need.
+ The entire unit fits neatly between your monitor and computer console.

Apple, Apple Logo, DOS 3.3, ProDOS and AppleWorks are registered trademarks of Apple Computer, Inc. CP/M is a registered trademark of Digital Research, Inc. Franklin Ace is a trademark of Franklin Computer Corp.

+ Each EquiDisk+ comes with a surge suppressor, three built-in AC outlets on the back and a front-mounted power switch. You can turn everything on and off at the same time.
+ CP/M users can access software formatted for other computers. Using one of the commercially available "transfer" programs, this feature allows you to access any CP/M software and run it on your Apple.
+ Works with the Franklin Ace 2000 series.

More for Everyone!

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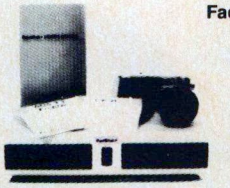
CP/M cards supported; Microsoft Softcard (56K and 60K Versions); ALS Z-Engine; PCPI (Starcard and Appli-Card)

+ Business — months of payroll, accounts receivable and payable, general ledger and daily correspondence . . . on one diskette.
+ Educators — consolidate all of your skill drills and tutorials, with room for individual work . . . on one diskette.



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*One standard Apple or equivalent drive

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OVER 100 WORDS in vocabularies that you can put into your own programs! No extra hardware required. Sample programs include:

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The $5 Talking Disk is available for Commodore 64, 128, Atari 800, 800XL, 130XE, and Apple II+ (64K), IIe, and IIc.

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SURGE PROTECTION

Ohm/Electronics announces their new Scooter Model SP100 Guard-It Single Outlet Surge Protector, applicable to any electronic equipment. This 125V, 15A, line protection device plugs into any 3-prong wall socket and glows to show that it's protecting the equipment against voltage surges.

It's ideal for single source protection of microcomputers, modems, television monitors, VCR's, microwave ovens, telecommunications equipment, stereo components, photocopiers, adding machines, or any other electronic equipment. Price: $9.95. *Ohm/Electronics, 746 Vermont St., Palatine, IL 60067. 800-323-2727.* CIRCLE **39** READER SERVICE CARD

NOTATE YOUR MUSIC

Temporal Acuity Products announces MusicPrinter, a new easily learned software program that allows musicians, copyists, and teachers to write complex music notation on any Apple II series computer with only 48K memory. Featuring the fast entry of notes, chords, and musical characters, the program allows for the creation of repeats, slurs, accents, and a full range of musical characters. Exact placement of any musical character, time signature, number of notes on the vertical or horizontal axis, and measures per line, as well as instant beaming and transposition, are all user controlled.

MusicPrinter has its own special word processor capability with three font styles for inserting words into choral music as well as writing comments on the score or texts to accompany music. Music can be printed in three styles; normal (fast), compressed (saves space), or emphasized (dark) in near laser quality using most major dot matrix printers.

Full and rapid editiing, deleting, justifying, disk filing, and printing functions are inherent in the program. Music can be printed as individual lines of music, as full scores from disk files, or as individual parts from full score. Printed results are suitable for publication. A logically coded one or two keystroke entry system is used. All entries are made directly from the computer keyboard. MIDI interface, synthesizers, or electronic pianos are not needed,. Price: $149.00. *Temporal Acuity Products, Inc., Building 1, Suite 200, 300 - 120th Ave. N.E., Bellevue, WA 98005, 1-800-426-2673.*

CIRCLE **40** READER SERVICE CARD

NEW MATH PROGRAMS

For the 7-11 Year Olds

Optimum Resource, Inc., announces the addition of two new math programs, Stickybear Math 2 and Math Word Problems. Both programs are designed for the home and school environment.

Stickybear Math 2 allows children ages 7-10 to develop multiplication and division skills. The program has many levels and automatically adjusts the problem difficulty to each student's needs. The teacher or parent may customize Stickybear Math 2, and a report card option is available to check each student's progress.

Math Word Problems is designed to help children ages 7-11 understand and solve math word problems. It provides practice in deductive as well as arithmetic skills, using mathematics adapted to everyday situations. Hundreds of problems with thousands of possible number variables are stored on the disk. As with Stickybear Math 2, a level adjustment monitor constantly checks progress and adjusts the level of difficulty without the student's knowledge. The teacher or parent may customize Word Problems to suit individual needs. A report card option is present to check and store the individual assignments and progress reports for up to 40 students. Price: $39.95 each. *Weekly Reader Family Software, 245 Long Hill Road, Middletown, CT 06457, 1-800-852-5000.* CIRCLE **41** READER SERVICE CARD

Fractions and Decimals

EduSoft introduces Worksheet Wizard II: Fractions and Worksheet Wizard II: Decimals, new math worksheet generators for the Apple. These programs each print individualized math worksheets for every student or class. Answer keys are printed automatically. Each worksheet includes the student's name along with optional due date and personal message.

Each program will hold class files of up to 36 students in 10 different classes. Teachers can print individual or class worksheets from six different topics: concepts, addition, subtraction, multiplication, division, or mixed operations. There are up to seven levels of problems in each area. These programs complete a comprehensive, three-program math package when joined with Worksheet Wizard I: Whole Numbers. Price $39.95 each. *EduSoft, P.O. Box 2560, Berkeley, CA 94702, 1-800-EDUSOFT.*

CIRCLE **42** READER SERVICE CARD

A SIGNMAKER FOR YOUR PLOTTER

Decision Graphics announces the DGI SIGNMAKER program now supports the APPLE COLOR PLOTTER. The DGI SIGNMAKER has been designed to quickly prepare text slides or signs for presentations.

The visual aides (text) for your presentations will now look professionally prepared, and only take you minutes to do.

The DGI SIGNMAKER is an easy to use menu driven program that allows you to create text slides. It provides automatic or manual selection of character size, starting location, justification, plotter pen selection, and choice of plotting on paper or transparencies.

System Requirements: APPLE II +/e/c, 48K memory and Super Serial card. Price: $75. *Decision Graphics, Inc., P.O. Box 2776, Littleton, CO 80161, (303) 796-0341* CIRCLE **43** READER SERVICE CARD

INSTANT SECRETARY

Softletters ia a comprehensive data disk of pre-written letters that you load into your word processor and then customize, change, or use any of the 50 letters as is, depending on your needs.

Available for the Macintosh and the Apple II with Magic Window, Magic Office System, AceWriter, Softletters allows you to save time composing letters by providing you with letters for almost any situation.

A sample of some of the categories and types of letters:

- Collection Letters: 3 letters in varying degrees of severity
- Complaints: Parking in the driveway, barking dog
- Employment: Position unsuited, poor attendance
- Apology for: Delayed credit, statement error, slow payment
- Congratulations: To a new employee, graduation, promotion

All can be personalized to suit individual needs, then generated individually as you need them or zeroxed in quantity. Price: $39.95.

artsci, 5547 Satsuma Avenue, North Hollywood, CA 91601, (818) 985-2922. CIRCLE **44** READER SERVICE CARD

A COLORFUL WORD PROCESSOR

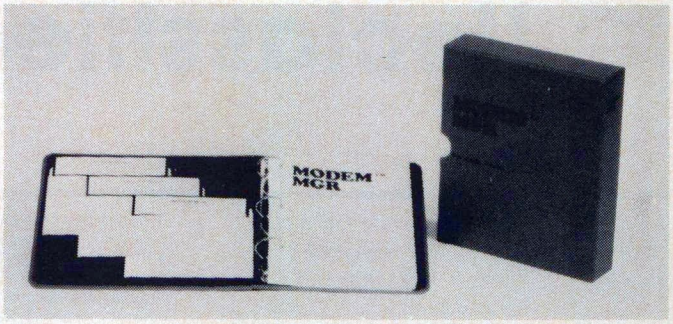
Scarborough Systems, Inc., announces MasterType's Writer, a new word processing software program which takes advantage of Apple's new UniDisk, the ImageWriter printer and color monitors.

MasterType's Writer for the 128K Apple *//e* and *//c* includes a new set of features designed to help computer users write better. Among those features is the effective use of color. By underlining words in color on the screen, MasterType's Writer marks those words to be printed in color on the new ImageWriter II printer. The program is perfect for Apple's new Color-Monitor *//e* or *//c*, since editing can be done in color, and then viewed in 80-column monochrome text on the same monitor to adjust printing specifications.

The product is ProDOS based and comes in both a traditional 5 ¼" disk version and a 3½" disk version for the UniDisk 3.5 disk drive. Users choose from either version since each one will load and save files from the other disk drive. A tutorial on disk is included.

Scarborough Systems, Inc., 55 S. Broadway, Tarrytown, NY 10591, (914) 332-4545. CIRCLE **45** READER SERVICE CARD

NEW MODEM SOFTWARE WITH UNUSUAL FEATURES



MODEM MGR is a new modem communications program for the Apple II +, IIc, or *//e*. In addition to the usual expected features, this program provides a split-screen option with a type-ahead buffer display. While received text is displayed on the upper screen, the user can type text to be transmitted next on the lower screen. This saves time during conferencing or chat operations and allows correction of typing errors before the text is sent. A full-screen display is also supported.

If a compatible clock card is installed, MODEM MGR will allow the continuous display of time-of-day or elapsed-time on the screen. The user can time his phone calls or use a programmed macro to execute unattended commands at any time of day. A macro script file can be programmed to automatically dial, log-on, and upload or download information early in the morning when long-distance telephone charges are lower.

In addition to capture of received text to a buffer, MODEM MGR also allows a "snapshot" of the screen display to be saved in the buffer. This allows capture of a disk catalog, a time-stamped screen, or status messages generated by the program.

MODEM MGR supports most internal and external modems. Both the DOS 3.3 and ProDOS versions are supplied together for a total price of $50. MGR SOFTWARE, Suite 101, 305 S. State College Blvd., Anaheim, CA 92806, (714) 993-0294. CIRCLE **46** READER SERVICE CARD

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CIRCLE 12 READER SERVICE CARD

APPLE *//e* SYSTEM FOR SALE—Apple *//e* with 65CO2 and ROM Enhancements, two drives and Monitor *///*, Extended 80-Column Card with 64K Extra RAM, Panasonic KX-P1091 Printer, Videx Parallel Interface with graphics features... plus a large assortment of software, including Games, Macro Assembler, Applesoft Utilities. ProDOS System and more! All manuals and lots of books and magazines also included. Price $1200 or best offer. Call Alex at (206) 633-2717.

WANTED— FOR ELEMENTARY SCHOOL AND HIGH SCHOOL—Apple computers (II, *//e* or *//c*). Donations are tax deductible. Call John Henning (206) 941-6786, Kent.

PRINT SHOP USERS CLUB—We help you get the full benefit out of Print Shop! The $30.00 membership fee includes: 1200+ Graphics on 6 disks, plus a public domain utilities disk, plus a copy of the club newsletter, Update Disk #1 (articles and 100+ more graphics). Send $30.00 or a SASE for graphics list to: Print Shop Users Club, Box 216, Mercer Island, WA 98040.

ALF 9 VOICE MUSIC SYSTEM FOR SALE—3 ALF MC16 music cards complete with updated software, user's manual, and 5 disks with over 120 songs. Total playing time over 4 hours!!! The sophisticated software allows you to enter music directly from sheet music in a simple, straightforward fashion. The envelope designer lets you create your own sounds. Album feature permits linking and random order playback of songs. Continuous play time limited only to disk space. (Multiple disk drives supported). 8 octave range with exceptional tuning accuracy. Please note that this system is not to be compared with music construction set/mockingboard type systems. Suitable for serious Music applications and ear training. For any Apple II computer. Original price $505, Asking price $225 or best offer. Stereo demo cassette available. For more info, please call Gary Baumoel at (707) 763-8300.

ELECTRONIC DRAFTKIT—Hi-res drawing program for the Apple II+, *//e*, and *//c*. For drawing electronic circuit schematics, printed circuit board layouts, architectural drawings, etc. 48 shapes and 2 font tables in memory at once. Work area is 2⅔ screen large. Rough/fine move, rough/fine four way scroll, draw/erase/rotate, plot/erase lines, type on draftboard (all ASCII characters: rotate, erase, inverse print). Fully menu driven (main, plot mode, typing mode, and DOS menus in memory and instantly available). Save/load/print pictures, change fonts. Main program in machine language, screen dump commands in BASIC, source code for several total picture printer dump routines provided (Epson, NEC printers—Grapple, Microtek, Apricorn interface cards). $28 (S&H included). R.J. Rowley, 1212 E. Del Rio Dr., Tempe, AZ 85282.

WORD SEARCH PUZZLES—are a great teaching aid to build vocabulary, improve spelling or for your own enjoyment. Up to forty words can be used. The size of the puzzle can be either 20 by 20 or 20 by 40 characters. Each puzzle has a unique solution, if you print the same puzzle twice each puzzle and solution is different. THE DGI NUMBER SEARCH program is also included. Only $30 postpaid for the APPLE II +/e/c. To order or for sample puzzle contact Chuck Blish, P.O. 2131, Littleton, CO, 80161, (303) 796-0341.

SURPLUS—MOVED TO MAC—Originals with manuals. Perry Mason, $15; Fantavision, $19.50; Carmen Sandiego, $15; Halley Project, $17.50; Borrowed Time, $15; Homeword Plus, $35; Screen Writer II, $25; Data Factory V6.0, $35; SpeedStat statistics, $35; Imagewriter II 32K memory option, $75. (602) 253-6528.

APPLEWRITER WPL EXPANSION KIT—Essential for major WPL applications. Ties in clock for automatic dating, adds 4 string variables ($E-H), adds 3 numeric variables (U,V,W), extends numeric variables to 3 bytes (16,777,215). Sold separately from $8. Kit $39.50 with documentation and support. Money-back guarantee! Call Don Thompson (714) 855-3838.

FRANKLIN/APPLE HARD DRIVES—Hardworks is a hard drive specially engineered to run on Franklin and II+ computers even where the Sider won't. * 20 Megabyte ProDOS 1.1.1 drive $999 * ProDOS and DOS 3.3 software $69 * ProDOS, Pascal, CP/M (Softcard, PCPI, Applicard, Franklin, Starcard), requires a true slot 6 $149 * ACE 2120 (the XT of the Apple world), a Franklin 2100 with an internal 20 Meg Hardworks drive $1895. Brought to you by the Franklin Users Group. (See International Compatibles) S&H $20 per order, Visa/MC charge 4%. A.S.C.I.I. 65 East Wind Rd. Tecumseh, MO 65760, (417) 679-3526.

APPLEWRITER *//e* USERS—"AppleWriterEnhancer" is a collection of Powerful WPL programs that tremendously simplify AppleWriter usage. Developed for needs of small office. DOS commands from SCROLLABLE CATALOG; load files from SCROLLABLE CATALOG; on-line CALCULATOR for simple calculations; determine FREE DISK SPACE; AUTOPRINTING ROUTINE to avoid constant changing of print destination; ALPHABETIZING ROUTINE to simplify proof reading; plus others. AppleWriter is one of the most powerful word processors around, and with AppleWriter Enhancer, it is as full-featured as some of the most exotic packages now being marketed. Specify DOS 3.3 or ProDOS. Send $34.95 to: MIC, Route 1, Box 235-A, Kent, CT 06757.

WANTED—Names and addresses of new and existing databases as well as information on money-making opportunities using my modem. William Cook, Box 55, Palos Verdes, CA 90274.

BURIED UNDER MOUNTAINS OF CORRESPONDENCE?—Let INSTA-LETTER help. This new and unusual piece of software is not a word processor. It contains over 35 actual skeleton letters including thank you, sympathy, complaint, collection, request, praise, and more! You personalize each letter with your own words. Use for home and business. Runs on any Apple II series computer with 80 column card and printer. Rush $49.95 to WordWeavers, P.O. Box 617, Dept 102, Kent, WA 98032. (Wa residents add 8.1% sales tax). Satisfaction Guaranteed!

LAB PARTNER—interface card & analog to digital converter & amplifier module, Apple II, *//e*, Swiss Army Knife Program (does about everything-data acquisition, display, printout), comprehensive manual, $124.95. Plug-in sensors: light, sound, position, temperature, force, $14.95 each; heart ECG monitor, $39.95. For science teachers, experimenters. NALAN Computer Specialties, 106 Highland Park Lane, Boone, NC 28607 (704) 264-2921.

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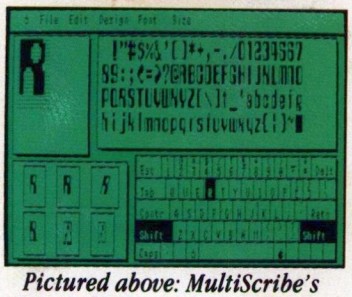

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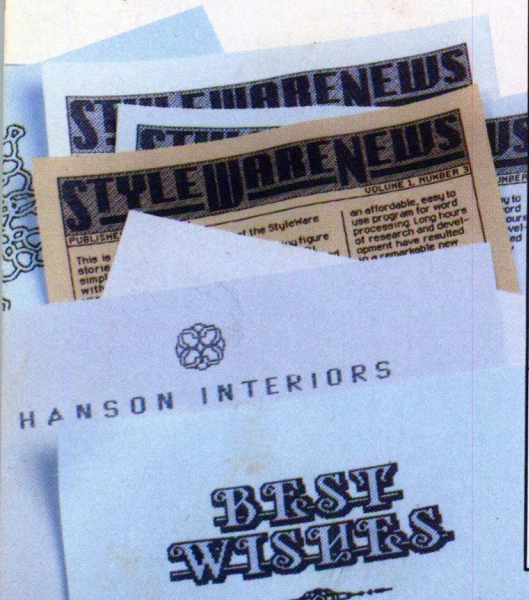

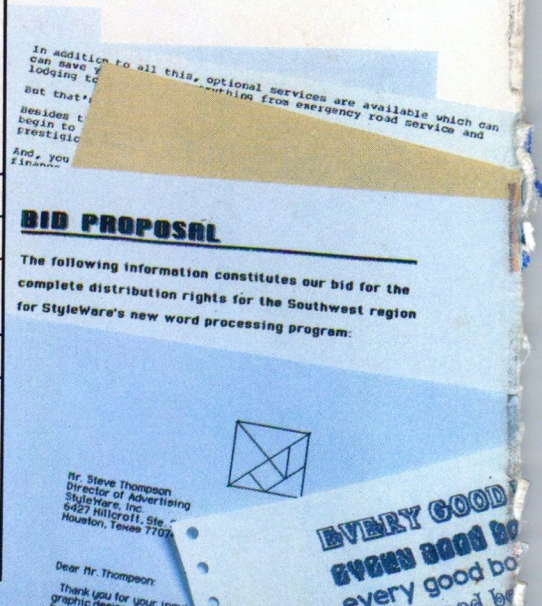
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